California Strategic Fuels Reserve

Stillwater Associates

March 13, 2002

Agenda

- Background
- Current Supply Issues
- Strategic Reserve Do's & Don'ts
- Current CA Inventories
- Markets
- Options
- Effectiveness & Cost/Benefits Analysis
- Conclusions

Background

- Supply disruptions in 1999 caused severe price spikes
- AG taskforce recommended creation of Strategic Fuels Reserve
- State Assembly orders CEC to establish feasibility of SFR and pipelines from US Gulf
- Stillwater Associates was retained by CEC in August 2001 to conduct Reserve Study
- Study started out with extensive survey meetings with industry Stakeholders
- Subsequent work led to Stillwater's involvement in SCAQMD Rule 1178 and MTBE Phase Out
- Preliminary conclusions and proposed solutions now presented for comments – focus is on gasoline

What is at Stake?

California has never run out of gasoline yet, but:

- California Gasoline has the highest price volatility of any commodity traded in the US, except for California power
- The California petroleum industry operates with smaller inventories in terms of days of supply than any other major market worldwide
- California is becoming increasingly import dependent for all its petroleum products
- Physical and commercial barriers to entry are currently already an impediment to imports
- CARB Phase III and the phase out of MTBE will make things more difficult

What is proposed?

A unique solution that minimizes State interference:

- State creates one stop-shopping, fast track permit procedures for petroleum infrastructure related projects
- State facilitates additions to tank capacity for use by the industry
- State holds small inventory not as stagnant reserve but as a mechanism for the industry to conduct forward trades
- Flexible approach to a complex problem

What the Proposals are NOT

- Not a large reserve with arbitrary release trigger overhanging the market
- Not involving Government Price Controls
- Not an impediment to supply/demand interaction
- No unfair competition with those deeply invested in California markets
- Not built and operated by government
- Not exclusive to any particular market segment

Agenda

- Background
- Current Supply Issues
  - Supply/Demand Balance
  - Impact of MTBE Phase Out
  - Imports
- Strategic Reserve Do's & Don'ts
- Current CA Inventories
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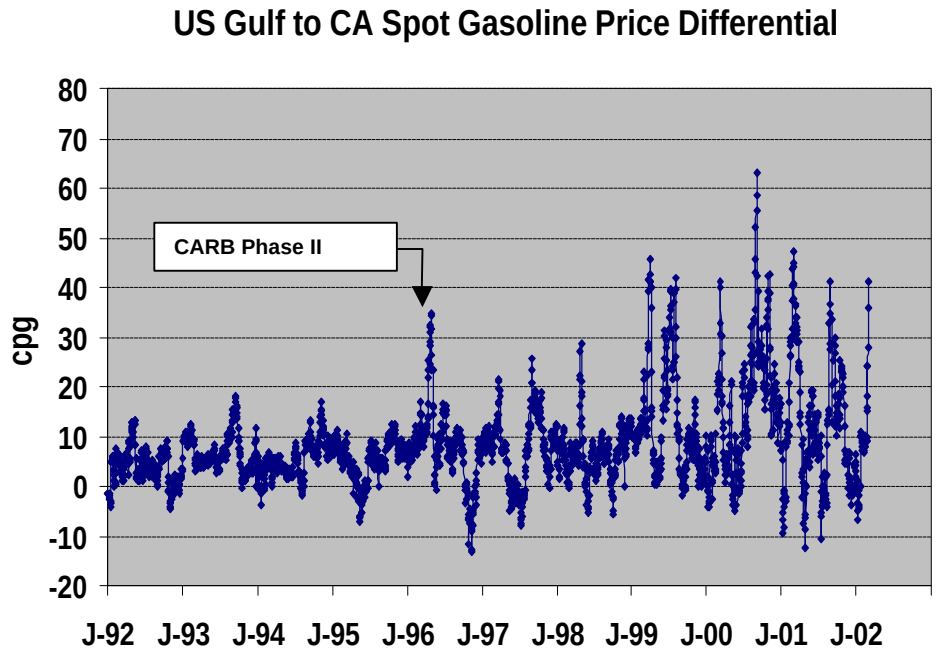
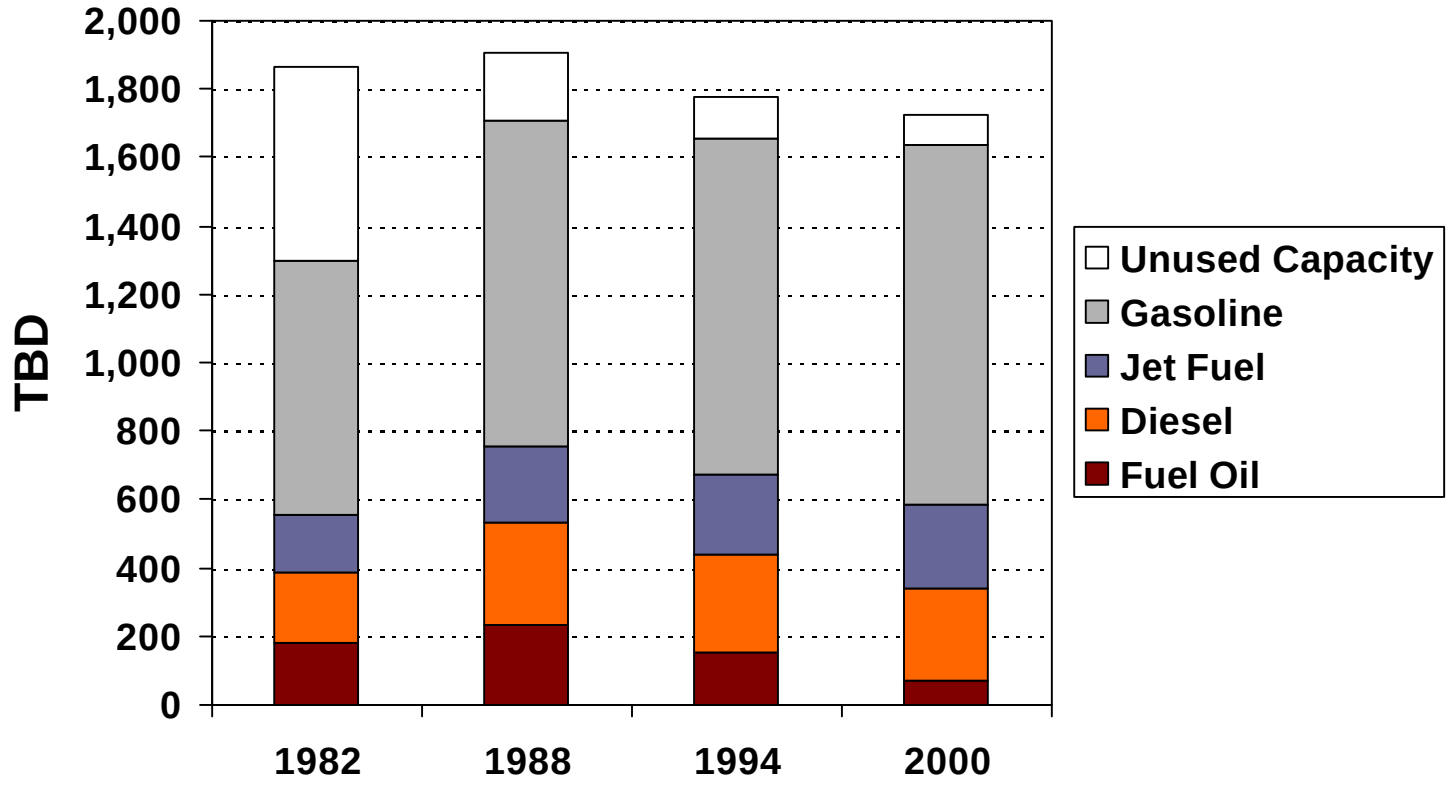
Current Market Instability



- Supply problems increased since 1996
- Rapidly increasing volatility indicates supply problems
- Underlying differential exceeds transportation cost, but little material moves
- Problems will become much worse with phase out of MTBE

Houston, we have a problem

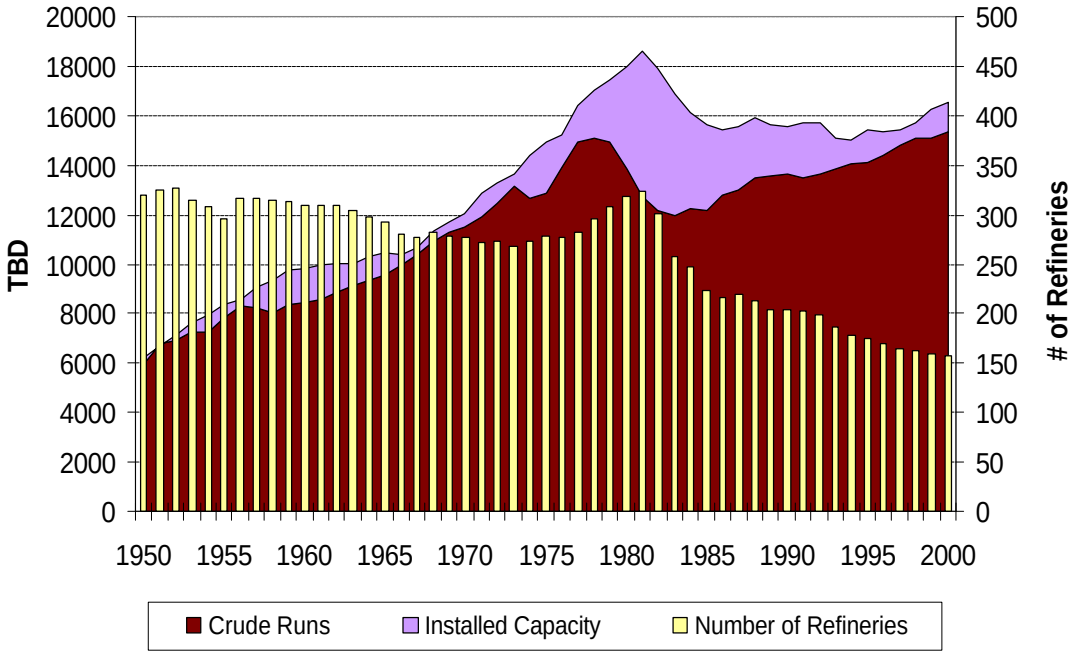
CA Refinery Capacity



CA refinery runs, gasoline production are at maximum capacity

Historical Analysis of US Refining Capacity

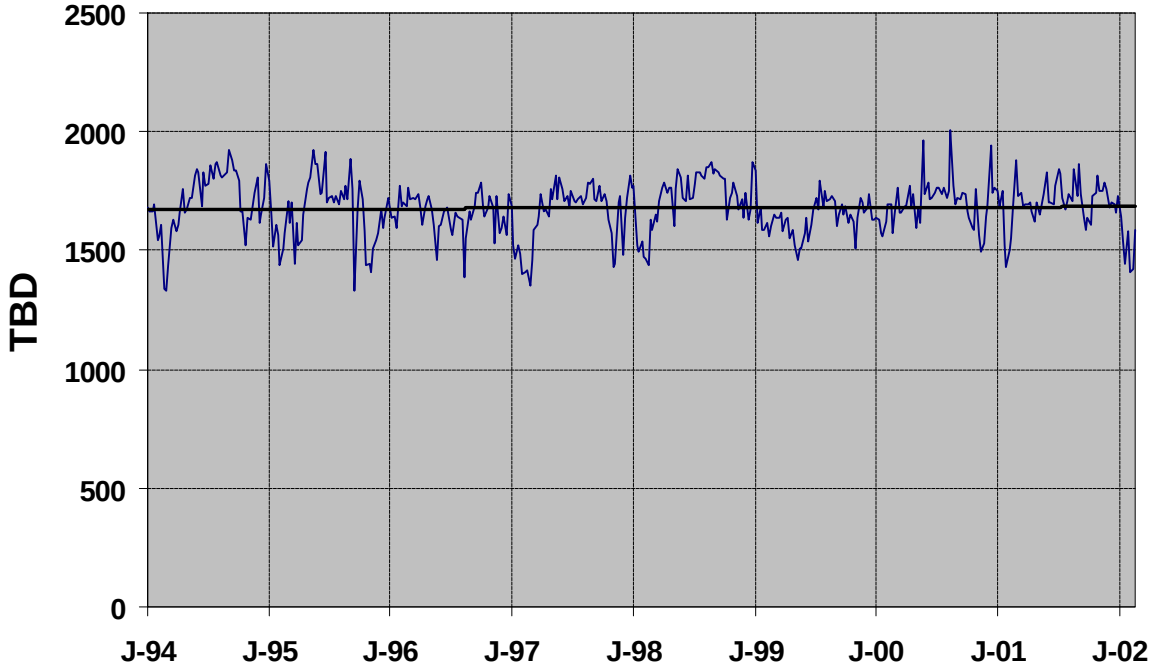
US Refineries – Installed and Used Distillation Capacity
1950 - 2000



- **Regulated environment of late 1970s led to over-building of capacity**
- **1981 Deregulation caused shutdown of non-economical refineries**
- **Last new refinery was built in US in 1981**
- **Over half of the then existing refineries have since been shut down**
- **Since 1984, distillation capacity has remained flat**

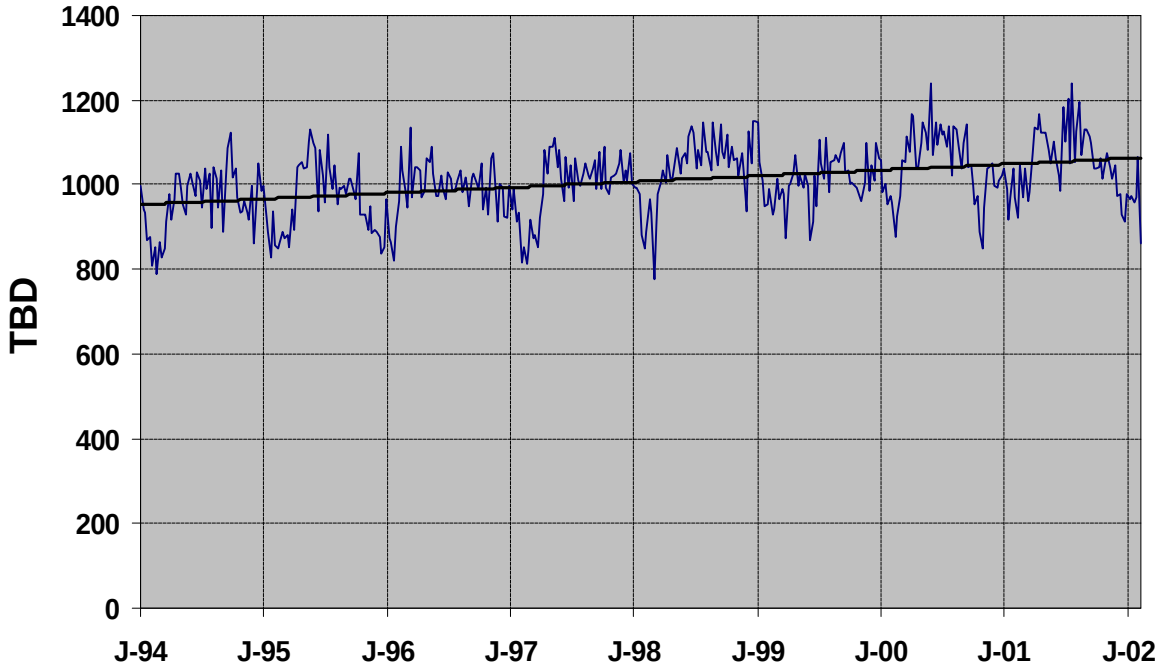
Refineries in US as a whole are at capacity

CA Refinery Crude Runs 1994 - 2001



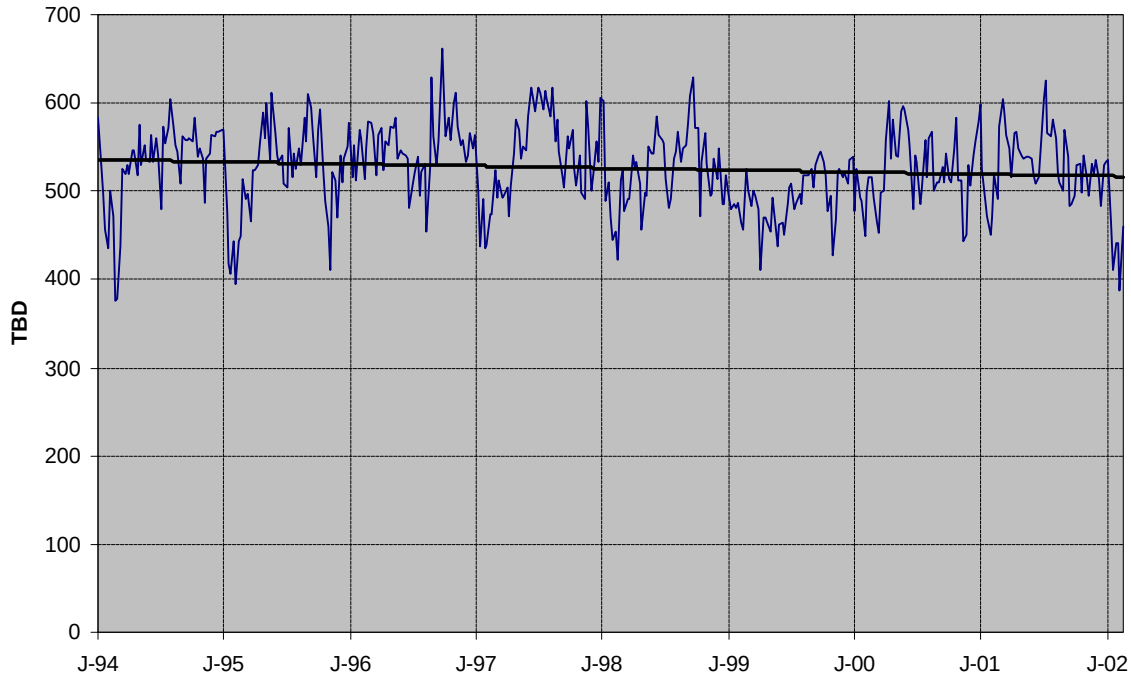
CA refinery crude runs are essentially flat

Gasoline Production by CA Refineries 1994 - 2001



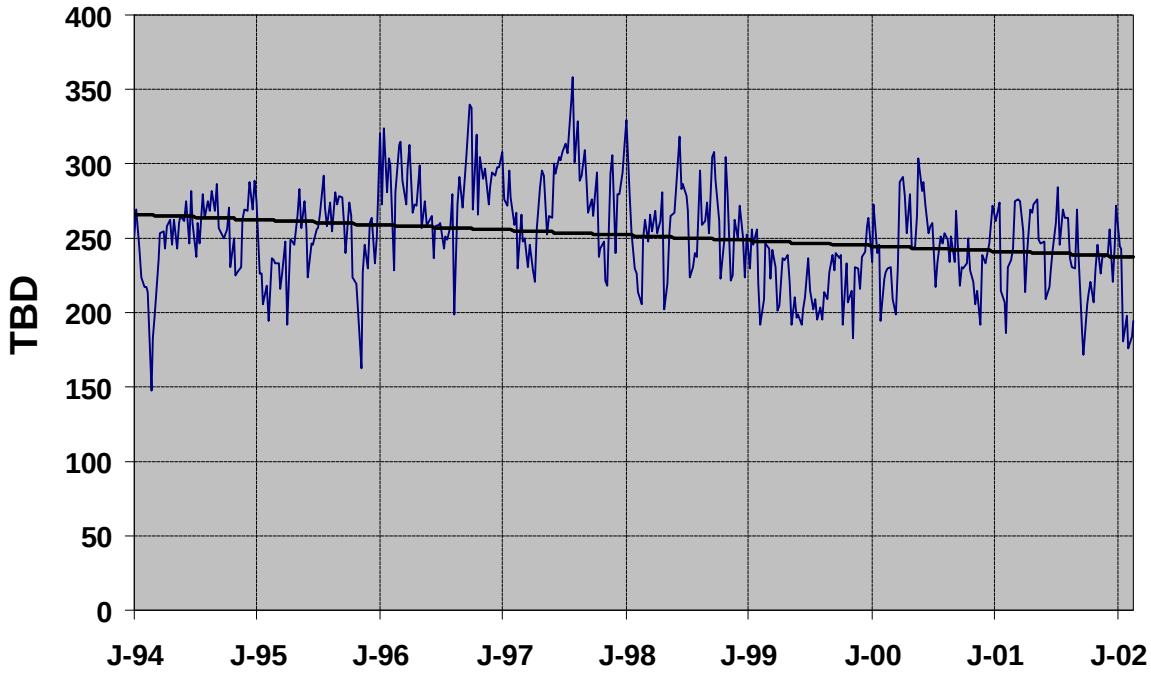
However, CA gasoline output has increased 1.3% per year

CA Production of Diesel 1994 - 2001



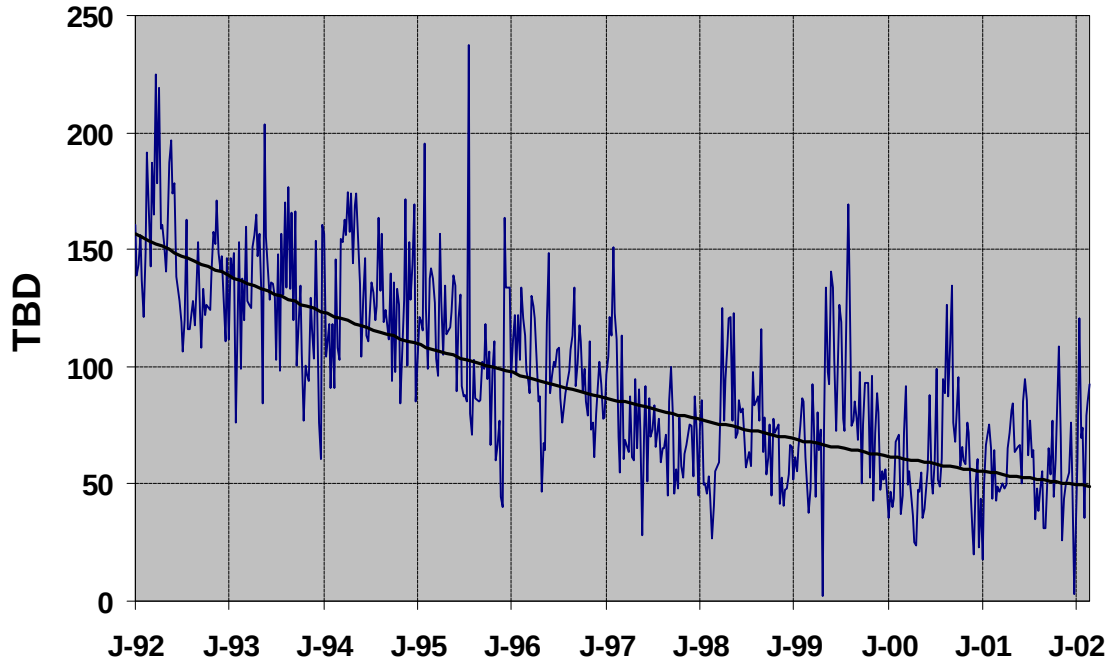
Over the same period, diesel decreased 0.4% per year

CA Production of Jet Fuel 1994 - 2001



Decrease is largest for jet, the easiest product to import

CA Production of Residual Fuels 1992 - 2001



CA refineries are close to reaching the bottom of the barrel

Refinery Disruptions

The underlying data for the disruption section have been provided to me by the US DOE and derived from third party sources and should not be quoted without my knowledge. The data have not been corroborated by the companies involved. Some, but not all, of the incidents have been verified in the public press.

Source: A. J. Finizza Ph.D.

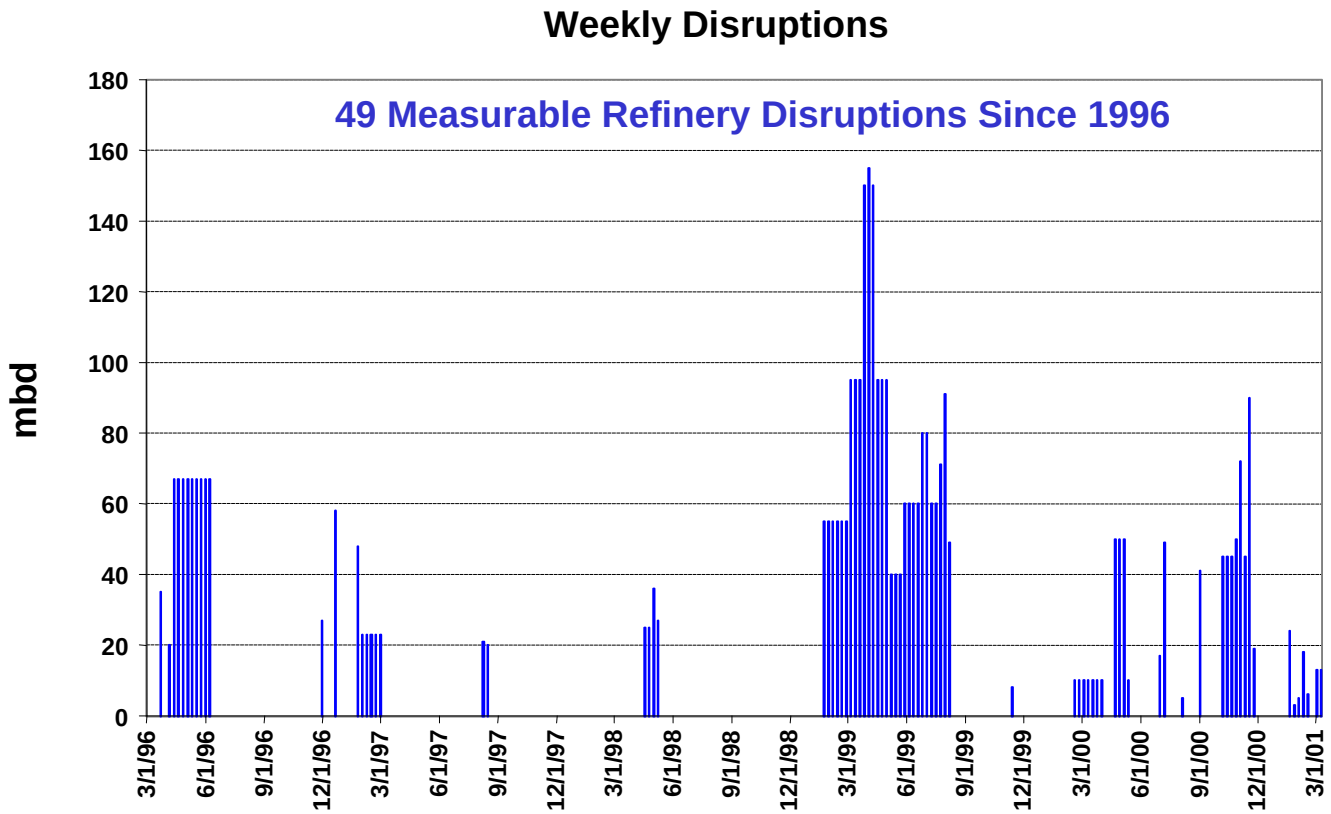
DOE Disruption Data March ’96 – March ’01

- DOE identified 65 Disruptions
- Only 49 contained Size and Duration data from OPIS reports
- Price data suggests potentially 15 other disruptions, not identified in the DOE database (of which 3 may have been turnarounds)
- Potential total number of disruptions is 80

Only the 49 confirmed outages were included in this analysis

Source: A. J. Finizza Ph.D.

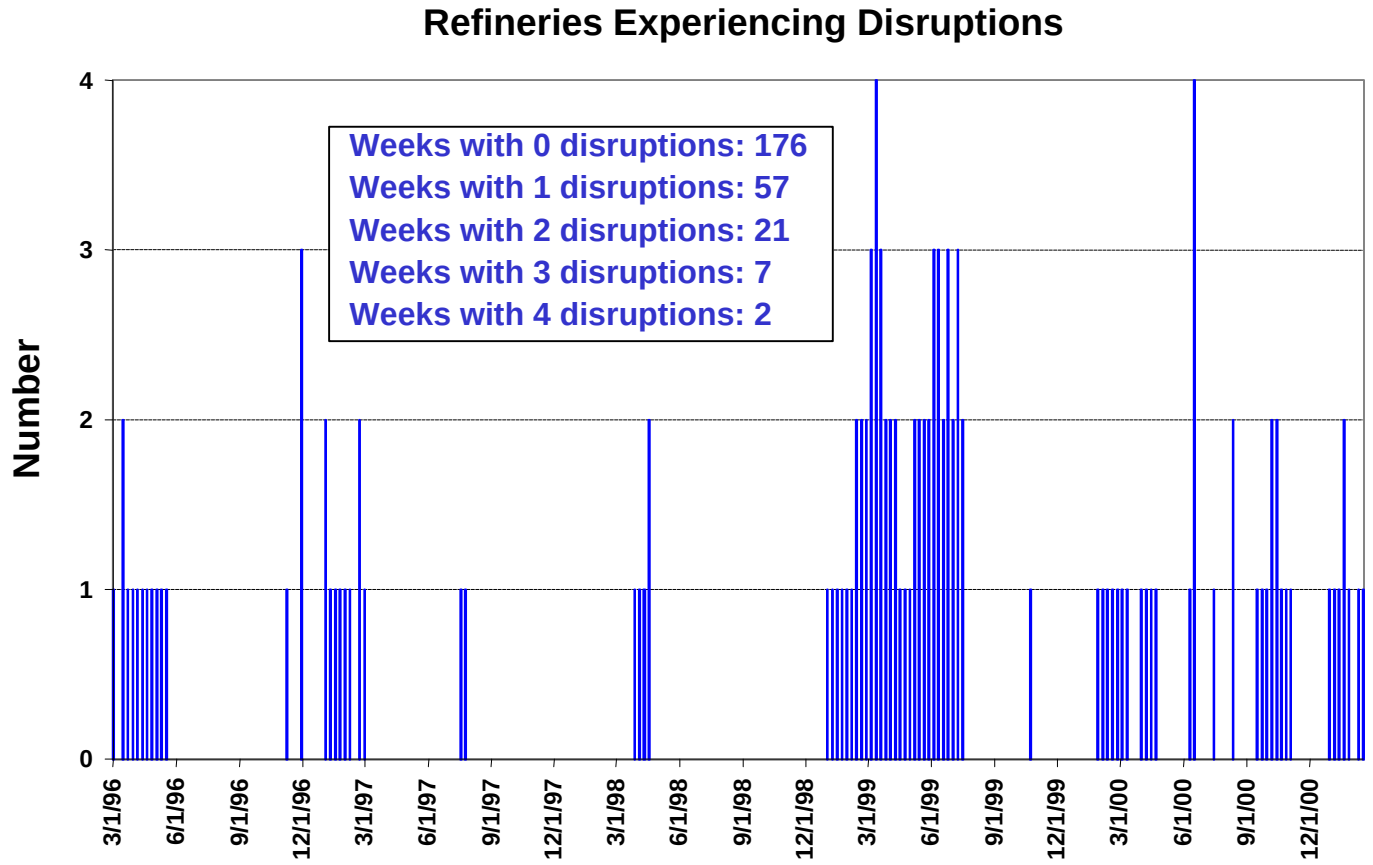
Occurrence of Refinery Disruptions



On average, refinery disruptions occur once a month since 1996

Source: A. J. Finizza Ph.D.

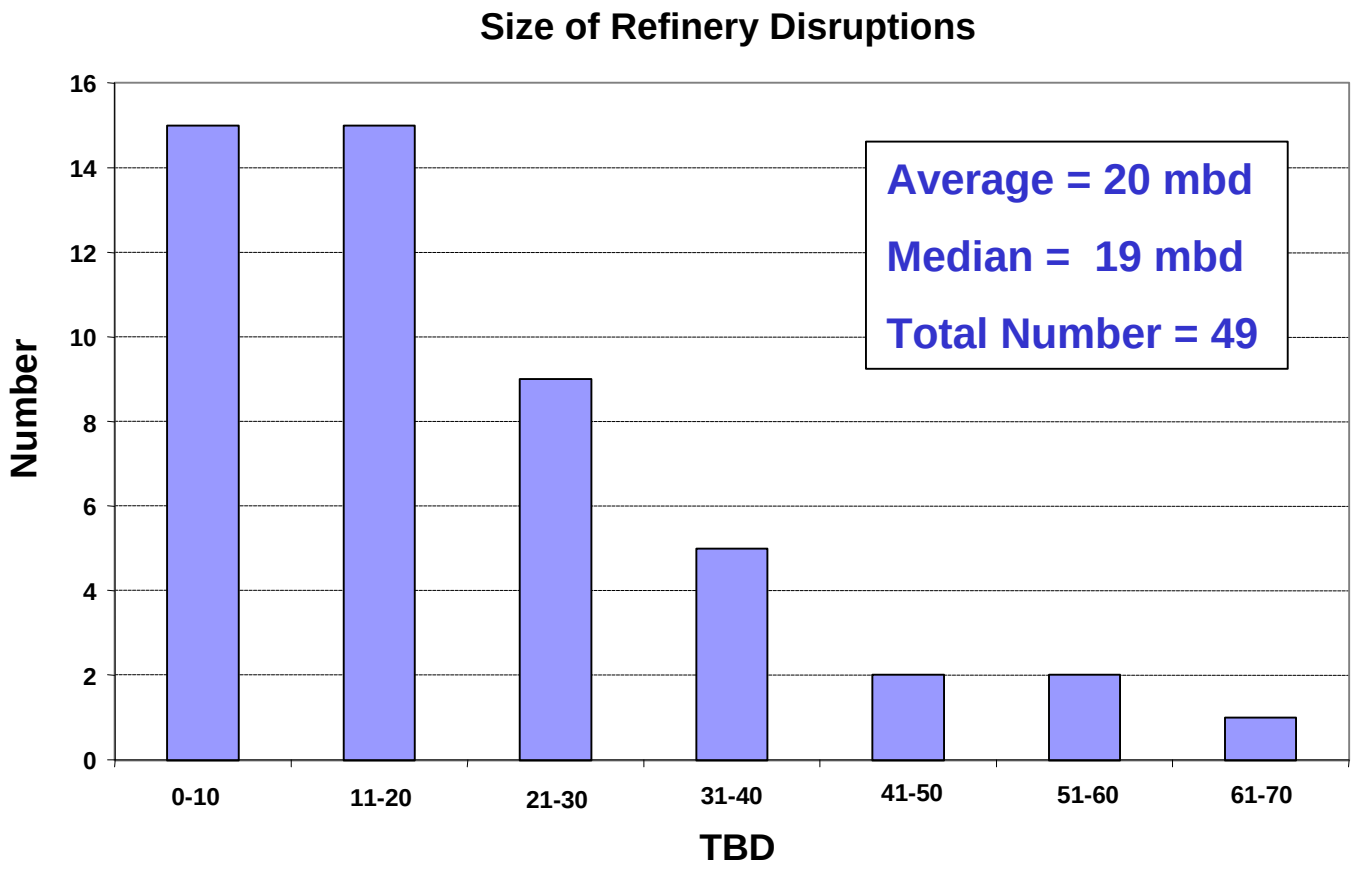
Probability of Simultaneous Events



Multiple refinery disruptions can be ongoing simultaneously

Source: A. J. Finizza Ph.D.

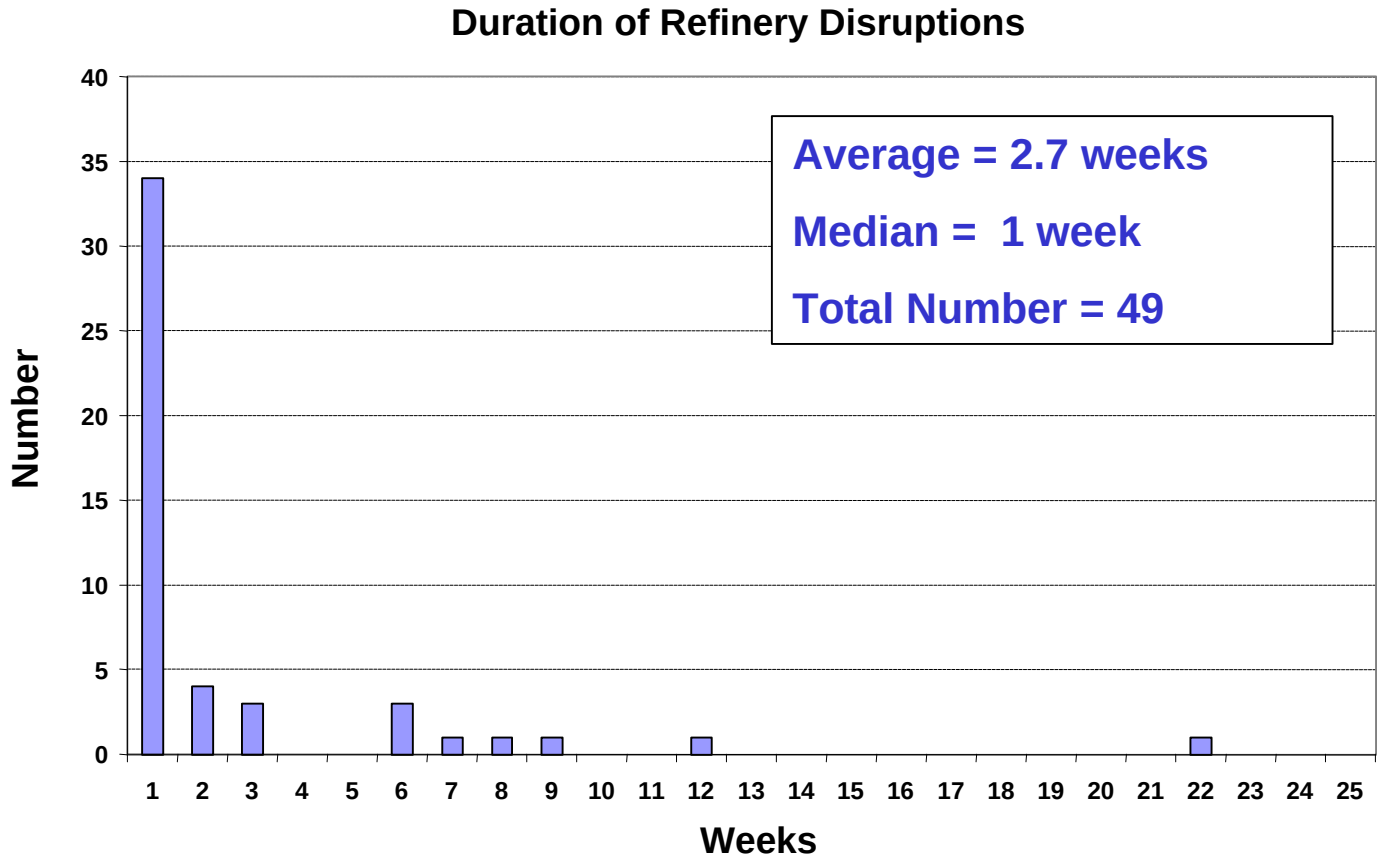
Frequency and Magnitude of Disruptions



Refinery disruptions average 20 TBD with several larger episodes

Source: A. J. Finizza Ph.D.

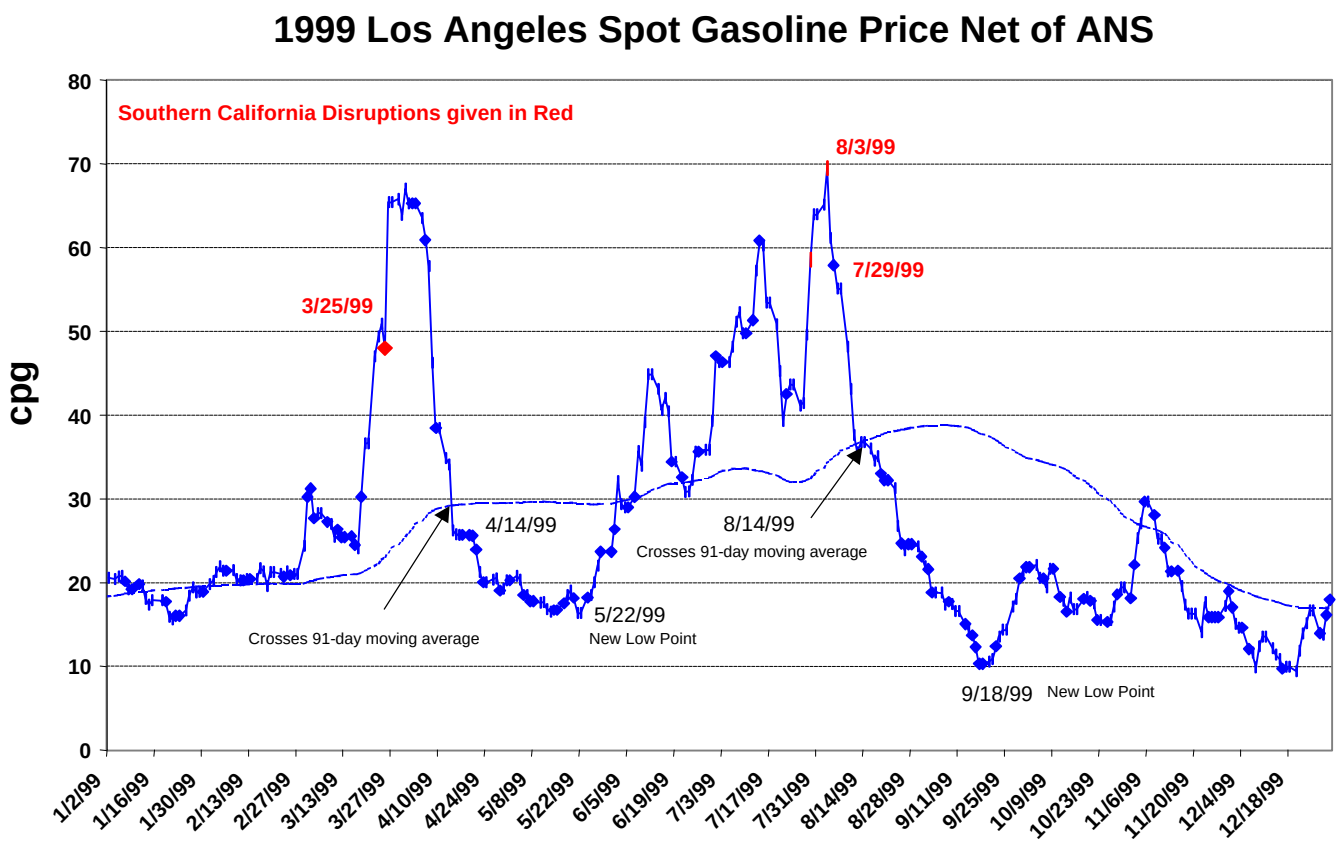
Frequency and Duration Refinery Disruptions



Refinery disruptions average 3 weeks with several longer episodes

Source: A. J. Finizza Ph.D.

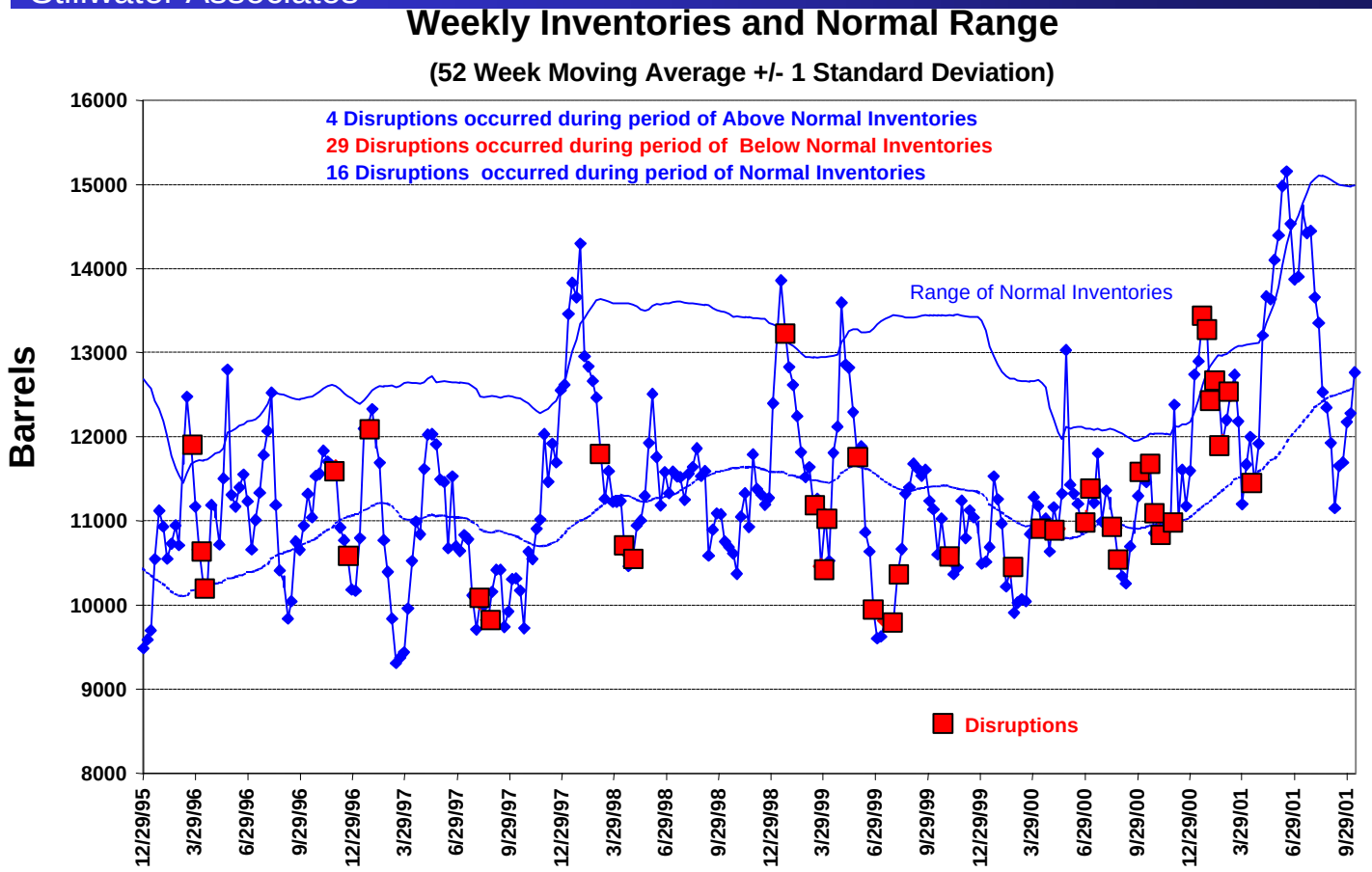
Duration of Disruption Effect



Disruption Effect Lasts 6-8 Weeks

Source: A. J. Finizza Ph.D.

Disruptions and Inventories



Most disruptions occur when inventories are below normal

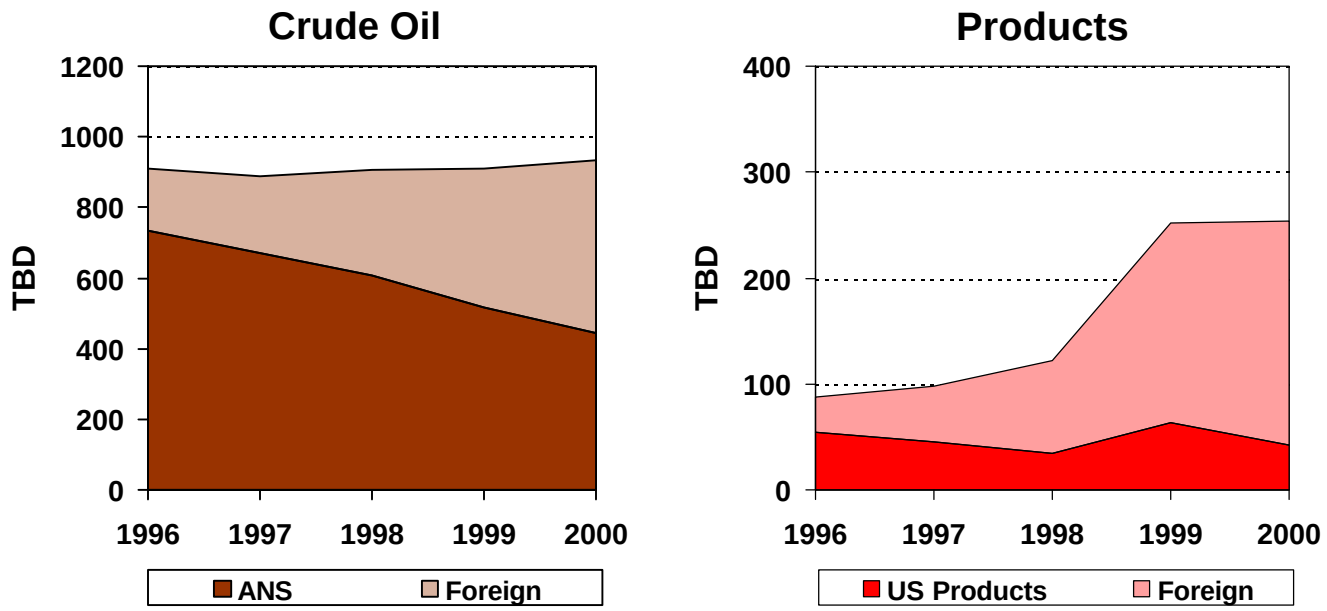
Source: A. J. Finizza Ph.D.

Summary of Supply by CA Refineries

- Refineries are operating at capacity
- 1994 – 2001 CA Refinery Output: annual increase 1.3%
- 0.6% is increase in component imports, 0.7% is refinery operations
- Many refineries have reached limits of Title V Operating Permits
- Small increase will require costly, difficult new permitting
- Even though at 95% of nameplate, overall performance is good, unplanned outages occur almost every month

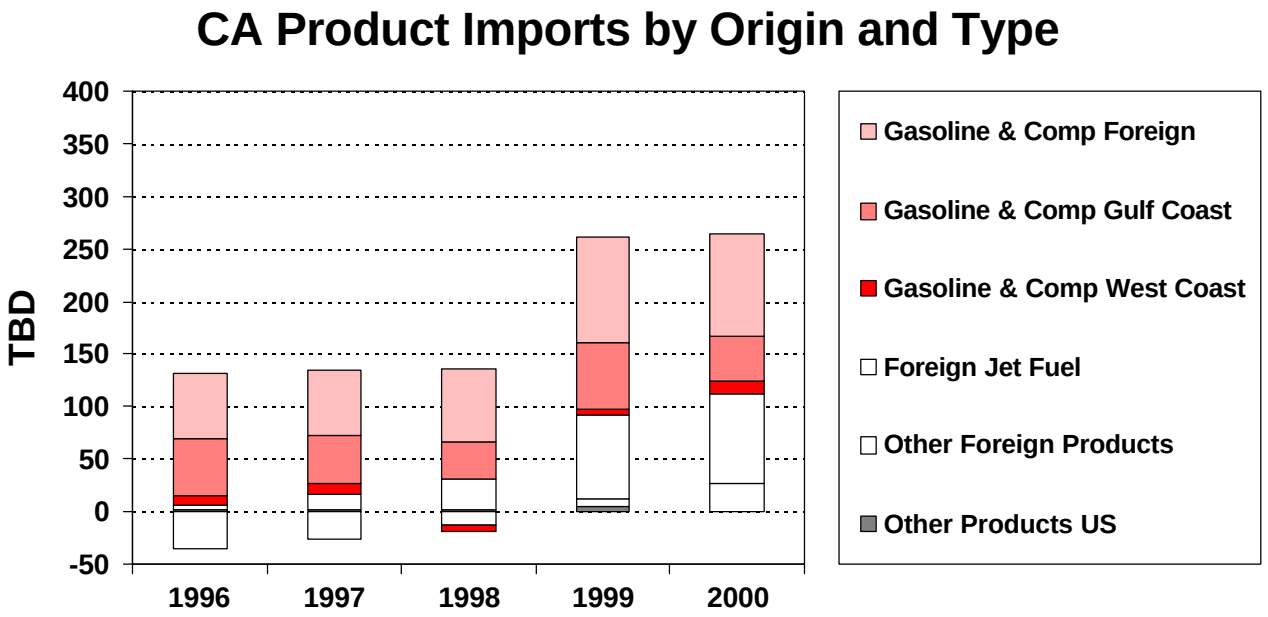
Demand growth in excess of creep and any lost production must come from imports

California Petroleum Imports



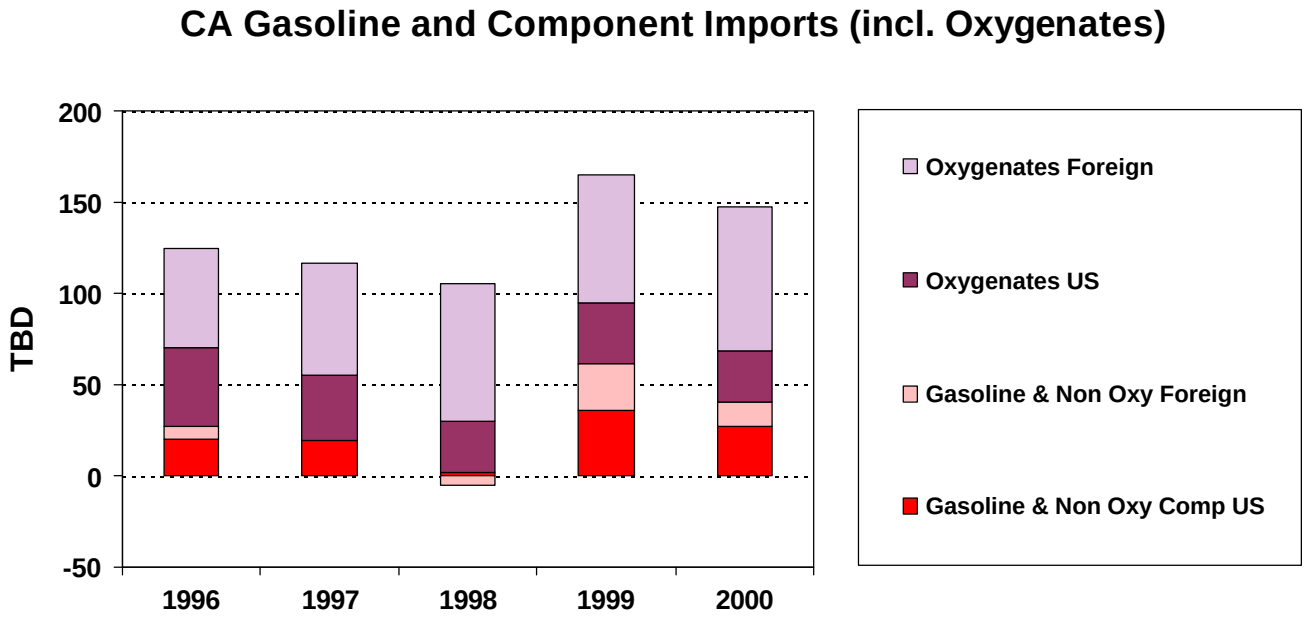
CA is increasingly import dependent for its petroleum products

CA Imports of Petroleum Products



CA has become a net importer for all products
Increase in imports is met from foreign sources

Breakdown of CA Gasoline Imports



Largest share of imports into CA Gasoline Pool is MTBE

CA Gasoline and Component Movements

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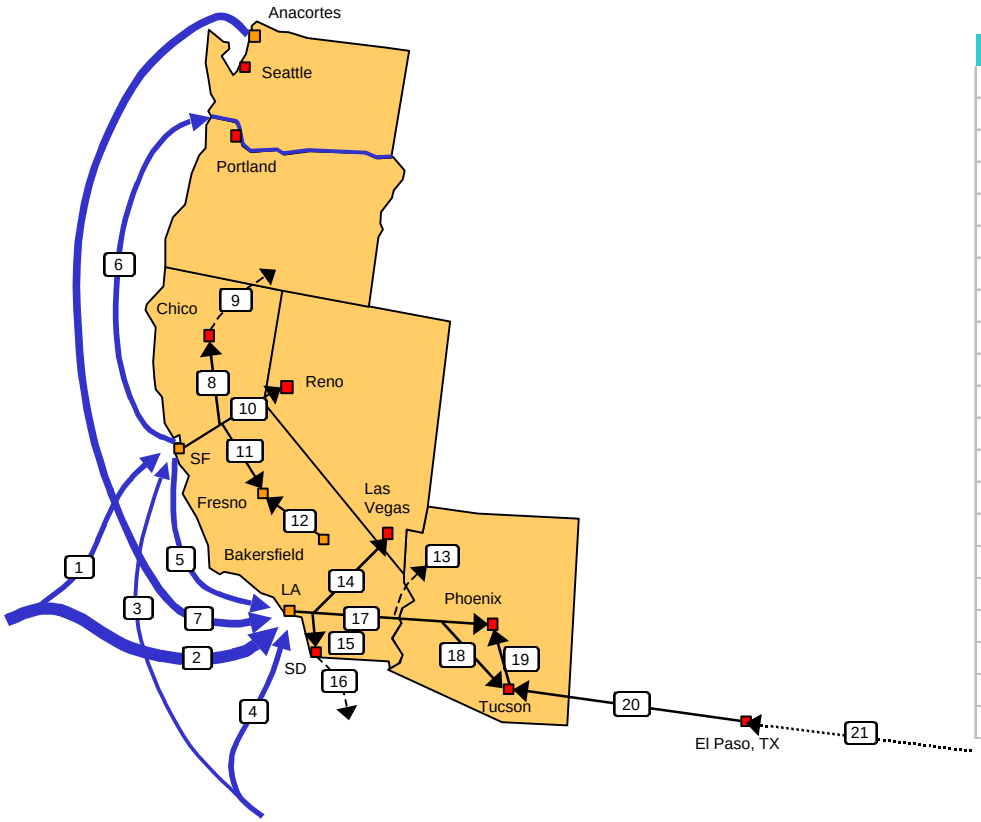


Year 2000 Volumes		TBD
1	Foreign Imports into N-CA	29.8
2	Foreign Imports into S-CA	68.4
3	PADD III Imports into N-CA	6.8
4	PADD III Imports into N-CA	22.1
5	Ship/barge SF to LA	24.5
6	Ship/barge SF to Portland	28.0
7	Ship/Barge WA to LA	38.0
8	Kinder Morgan SF to Chico	17.6
9	Truck Chico into S-OR	0.4
10	Kinder Morgan SF to Reno	17.3
11	Kinder Morgan SF to Fresno	n/a
12	Kinder Morgan B'field to Fresno	n/a
13	Truck S-CA to W-NV, AZ	2.5
14	CALNEV LA to Las Vegas	45.9
15	Kinder Morgan LA to San Diego	n/a
16	Truck SD to Mexico	n/a
17	Kinder Morgan LA to Phoenix	60.9
18	Kinder Morgan LA - Tucson	4.1
19	Kinder Morgan El Paso - Phoenix	41.0
20	Kinder Morgan El Paso - Tucson	28.0
21	Longhorn	

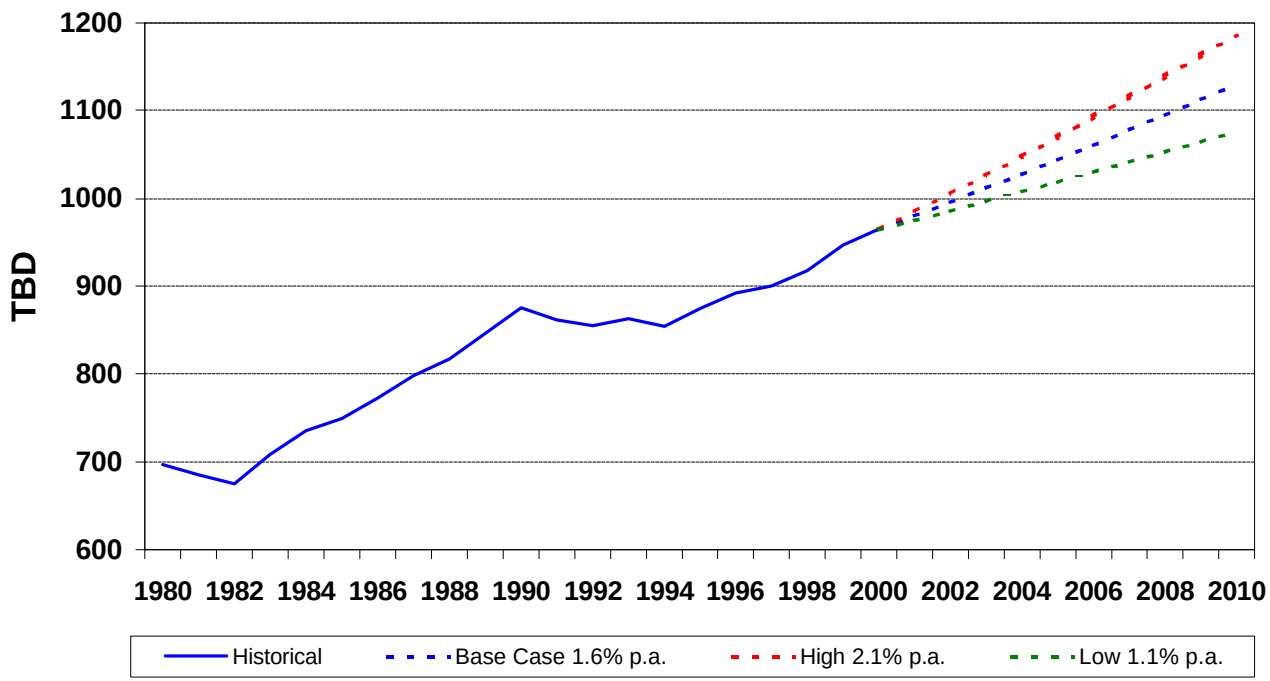
S-CA is most dependent on imports

CA Gasoline Demand – Growth Drivers

- **Population**
  - Growth CA 1980 – 2000: 1.9% per year; forecast 2000 – 2020: 1.4% per year
  - CA also supplies fuels to fast growing urban centers in NV, AZ
- **Population Density**
  - Land development in CA shows second highest urban sprawl in nation
  - Trend expected to worsen given disparate location of jobs and cheaper housing
- **Fuel Affordability**
  - Per capita income 1980 – 2000 increased 3.1% per year
  - Constant dollar cost of gasoline fell 30% in past 20 years
  - Trends expected to level, but not reverse in next 5 years
- **Vehicle Miles Traveled**
  - Increase 1980 – 2000: 3.3% per year
  - Forecast 2000 – 2020: slow down to 1.9% per year
- **Fuel Economy**
  - Average light duty vehicles improved from 12.6 mpg in 1980 to 20.7 mpg in 2000
  - Current trend is slight reversal due to popularity of light trucks, SUVs

Source: California Energy Commission Study on Transportation Fuels, December 2002

CARB RFG Demand



High 2.1%

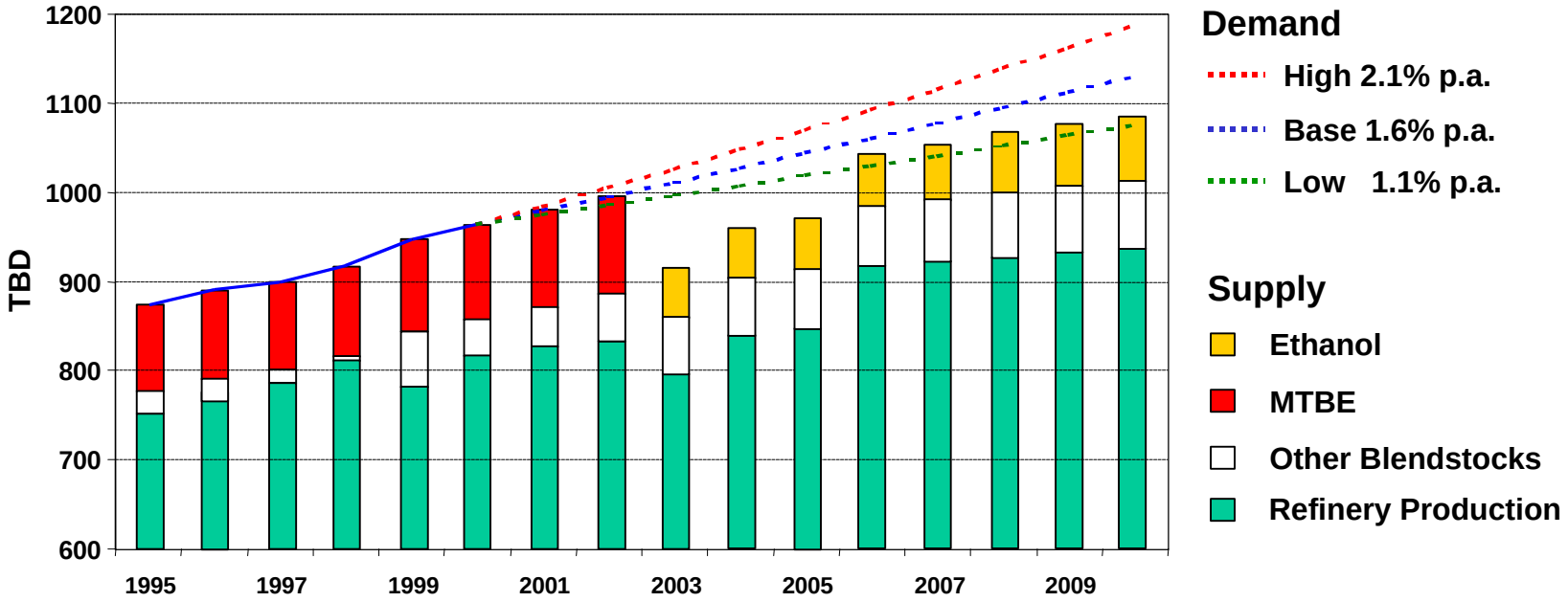
Base 1.6%

Low 1.1%

Current indicators show no sign of diminishing demand

Supply/Demand Forecast

CA Historical and Forecasted Gasoline Demand



2003: MTBE Out - 110, Ethanol In + 55, Refinery Cap Loss - 45, Additional Blendstocks + 10, 1% Creep
2003: Avon + 23; 2006: Longhorn substitution + 70
All other years: Imports other than oxygenates highest historical + 10%, capacity creep 1%

Impact of 2003 MTBE Phase Out

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	TBD	N-CA	S-CA	Total CA
MTBE Balance				
RFG production		386	549	935
Ethanol Based CARB RFG		40	70	110
MTBE Based CARB RFG		346	479	825
MTBE Required @ 11%		**38**	**53**	**91**
MTBE imports foreign		24	51	75
MTBE imports US Gulf Coast		7	10	17
MTBE production		7	3	10
Total MTBE supply		**38**	**64**	**102**
Excess MTBE		0	11	11
Direct Impact				
Removal of MTBE		-38	-64	-102
Ethanol addition for oxygen requirement		21	34	55
Removal of butanes & pentanes		-17	-29	-46
Other Losses to meet distillation specs		-4	-6	-10
		-38	**-65**	**-103**
Capacity Compensation				
Major refinery capacity additions		22	0	22
Small CARB III mods, MTBE C4 to alky		3	2	5
Capacity Creep 2001 - 2002, 1%		4	6	10
Identified blendstock imports by refiners		0	10	10
		29	**18**	**47**
Net Shortfall		**-9**	**-47**	**-56**

Southern CA most impacted by MTBE Phase Out

Regional Supply/Demand Balance – Base Case

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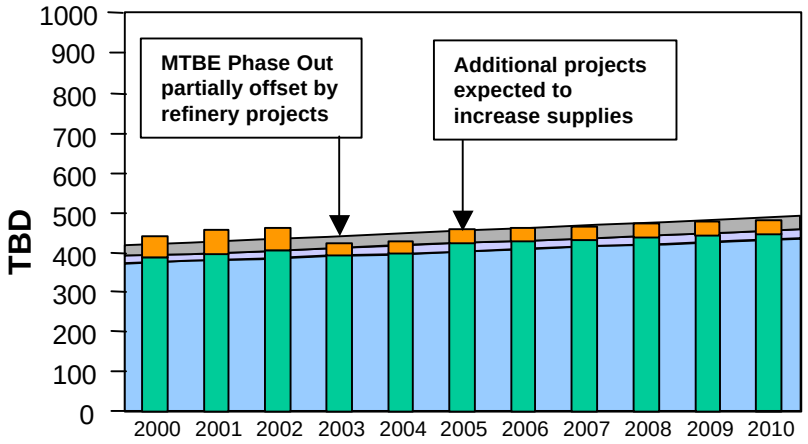
Northern California



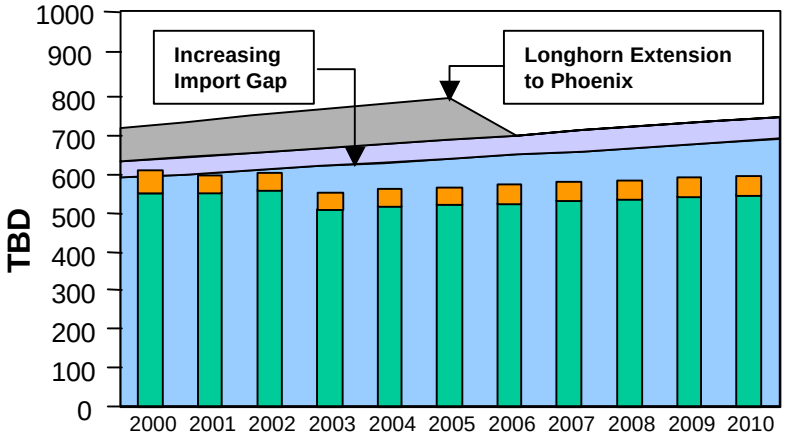
Demand

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
OR	28	28	29	29	30	30	31	31	32	32	32
N-NV	17	18	18	19	19	20	20	21	22	22	23
N-CA	372	378	384	390	396	403	409	416	422	429	436

Supply

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CONV	52	58	54	31	31	32	32	32	33	33	33
RFG	386	398	404	395	399	425	429	433	438	442	447

Southern California



Demand

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AZ	87	91	95	99	102	106	0	0	0	0	0
S-NV	41	43	45	47	48	50	51	53	54	55	56
S-CA	591	600	610	620	630	640	650	660	671	682	693

Supply

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CONV	58	43	44	44	45	46	47	47	48	49	50
RFG	549	552	558	511	516	521	526	532	537	542	548

So-CAL supplies need to increase by 50 – 100 TBD

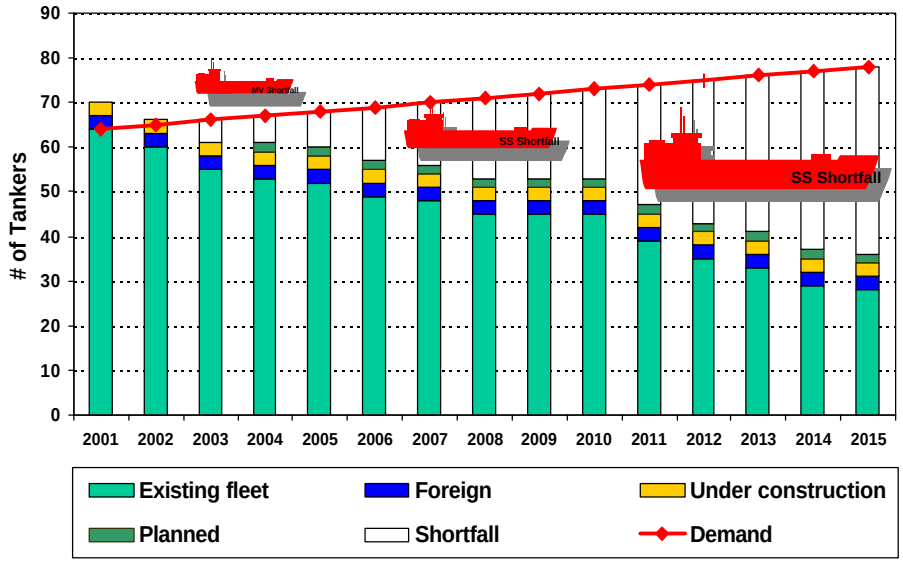
Increased Supply – US Gulf Coast Options

- There is no large surplus ready to ship to CA
- There are no producers capable of producing Phase III CARBOB
- Existing production of premium blendstocks will have to be bought away from East Coast markets
- Supplies of alkylate, the prime blending component to replace MTBE, will tighten when the economy recovers
- In the past, alkylate prices have been 30 to 40 cpg over gasoline because of chemical demand for its key ingredient, propylene

Even if the product where to be there, can we ship it?

Increased Supply – Jones Act Shipping Factor

OPA90 Tanker Retirement Plan



- Current imports from US Gulf Coast to CA 11 TBD
- To increase by 55 TBD would require 8 additional ships
- OPA90 (double hull requirement) will phase out 20 ships in near future
- New launches unlikely due high cost and uncertain future

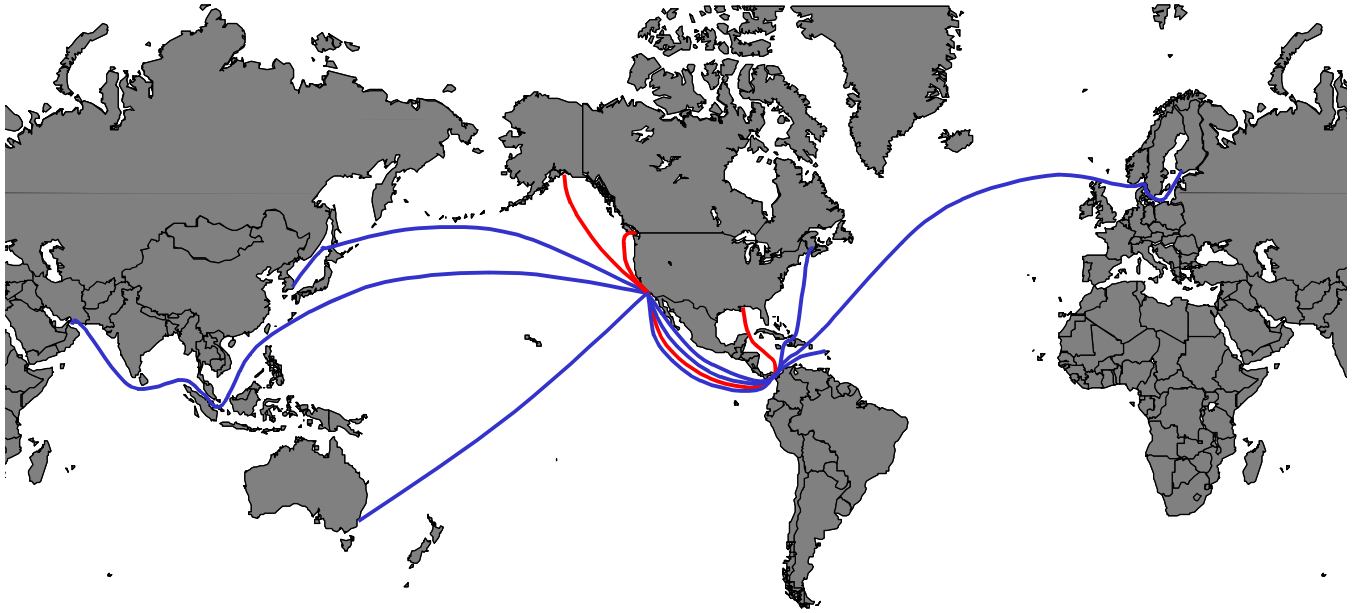
US Gulf Supplies to CA: Product Not There, Ships Not There

Increased Supplies – Identified Foreign Imports

- Only one foreign refiner identified who will be capable of producing Phase III CARBOB (Irving, New Brunswick, 2 cargoes/month, or 10 TBD)
- Other foreign refiners currently capable of producing Phase II CARBOB have alternative markets, and lack investment incentive
- Envirofuels (Alberta) likely to convert 18.5 TBD of MTBE into 11 TBD of isooctane
- Dubai venture likely to increase production of near CARBOB Phase III quality material from 10 to 25 TBD
- Global majors operating in CA market are likely to optimize worldwide sourcing (10 TBD already included in Phase III compliance plans)

At sustained high CA prices, imports will be mobilized
Question is: How will these products reach the market?

California's Gasoline Import Routes



Arabian Gulf	**11 cpg**	**33 days**	**Alaska**	**10 cpg**	**8 days**	**Caribbean**	**7 cpg**	**14 days**
Korea	**7 cpg**	**16 days**	**Washington**	**4 cpg**	**4 days**	**Canada E/C**	**8 cpg**	**21 days**
Australia	**9 cpg**	**20 days**	**USGC**	**12 cpg**	**18 days**	**Finland**	**10 cpg**	**30 days**

Physical Barriers to Entry in CA Market

Barriers identified by CEC Strategic Fuels Reserve Study:

- Lack of deepwater storage terminals, particularly in LA Basin
- Over half of capacity in hands of majors
- Ports of LA, Long Beach favor container and car terminals
- City officials, action groups want removal of several terminals
- SCAQMD Rule 1178 will cause 10% of LA tanks to be temporarily out of service over next 7 years
- Significant capacity lost, more threatened by non-renewal of leases
- New capacity faces hostile permitting environment
- New capacity can only be built with bankable contracts
- Traders unable to sign long-term, i.e., 10-year, commitments

Lack of storage is main barrier to import

Summary of Supply/Demand Situation

- CA refineries are running at maximum practical operating rates
  - 95% of nameplate is very high given age and complexity of installations
  - Remaining 5% is taken up by maintenance, breakdowns, supply issues
  - Running flat-out precludes rebuilding inventories after outages
- Opportunities to increase capacity diminish
  - CAAA Title V Operating Permits are limiting unit capacities
  - NOx credits unavailable
- MTBE Phase Out will create 50 - 100 TBD shortfall, mainly in S-CA
- Shortfalls have to be made up by imports but
  - Domestic and foreign avails are limited
  - Increases in domestic sourcing outside CA are limited by shipping
  - Import receipt capabilities are restricted by infrastructure and port policies
  - Global competition for key blending components increases
  - New capacity requires investment grade long term contracts

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  - Other Reserves
  - Release Mechanisms
  - Requirements for CA SFR
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Other Reserves – Federal Petroleum Reserve

- 1974 International Energy Agency, 28 signatory countries, response to first oil crisis
- 1975 Energy Policy and Conservation Act (EPCA)
- 1977 FPR commissioned, 1 billion barrel capacity
- EPCA provides for creation of Regional Petroleum Product Reserves
- NE Heating Oil Reserve was created as an RPPR using FPR crude oil sales to purchase heating oil

FPR may provide means to partially fund CA SFR inventory

Other Reserves – Northeastern Heating Oil Reserve

	Northeast HO*	CA Gasoline
Demand	0.7 MM BPD winter average	1.0 MM BPD year round
Available Inventory Range	20 to 60 MM bbl = 40 MM bbl	18 – 10 MM bbl = 8 MM bbl
Effective days inventory	70 days av. winter demand	8 days regular demand
Product Fungibility	Readily fungible	Unique to CA
Product Grades	One	Multiple Summer and Winter
Blending restrictions	None	Unocal Patent, CARB cert.
Market Liquidity	1000+ trades/day	<20 trades/day
Futures Market	Broad, up to 1 year deep	Narrow, next month only
Market participants	Large Community	Closed Market
Pricing	Transparent	Limited reporting
Demand	Seasonal Only	Year Round
Import options	100s of refineries worldwide	3 – 5 refineries
Shipping time	1 – 2 weeks	5 – 8 weeks
Import terminals	68 in 26 ports	16 in 2 ports (incl. refineries)
% of Population Affected	11% (54% in Maine)	>90%

CA Gasoline more vulnerable than NE Heating Oil

Other Reserves – More Lessons for CA

- SFRs usually designed for reasons of national security, with very large capacities (60 – 90 days)
- Only one other know example of SFR designed to mitigate price spikes (NE Heating Oil)
- Event driven triggers, especially those with discretionary authority for release, are an impediment to supplies (FPR, Northeast Heating Oil)
- SFRs can play an important role in opening up markets (Japan, Korea)
- SFRs must be fully integrated, with continuous throughput for quality reasons (various European countries)

Release Mechanisms

Event Triggered

- Even when conditions and authority are well defined, can create market uncertainty
- Best suited for large national Strategic Reserves, with events defined in terms of national security
- Can be misused by political powers

Price Triggered

- Requires complex pricing formulas
- Even when criteria for release are well defined, creates significant market uncertainty
- Can form impediment to normal supplies
- Can be misused through gaming
- Costly to maintain because of sell-low, buy-high factors

Continuous Access

- Any qualified party can always borrow from reserve
- Use is time-swap only
- Requires well defined operating procedures
- Can stimulate normal supplies
- Can form basis for forward market
- Cost of initial fill only, all usage replacement in kind

Logistics Requirements for SFR

- Starting point is AB 2076 requirement for 2 weeks supply of largest refinery, or 2.3 MM bbl effective (2.5 MM bbl gross)
- Separate N-CA and S-CA markets cannot be served effectively from a single location, proposed split 0.9 MMB North, 1.4 MMB South
- Logistics requirements dictate that SFR must be
  - Integrated into the infrastructure of the Bay Area and LA Basin refining centers
  - Connected to Kinder Morgan Pipeline Systems
  - Have deepwater access
  - Have flexible drain-dry tankage suitable for multiple grades, components, plus blending capability

Commercial Requirements for SFR

- Reserve cannot occupy scarce existing tankage without severely impacting the current fragile supply/demand balance
- Reserve must be accessible to all qualified parties
  - CA Refiners
  - Qualified Traders, Importers
  - Independent Marketers
- Release mechanism must be
  - Clearly defined
  - Designed such that imports are facilitated rather than hampered

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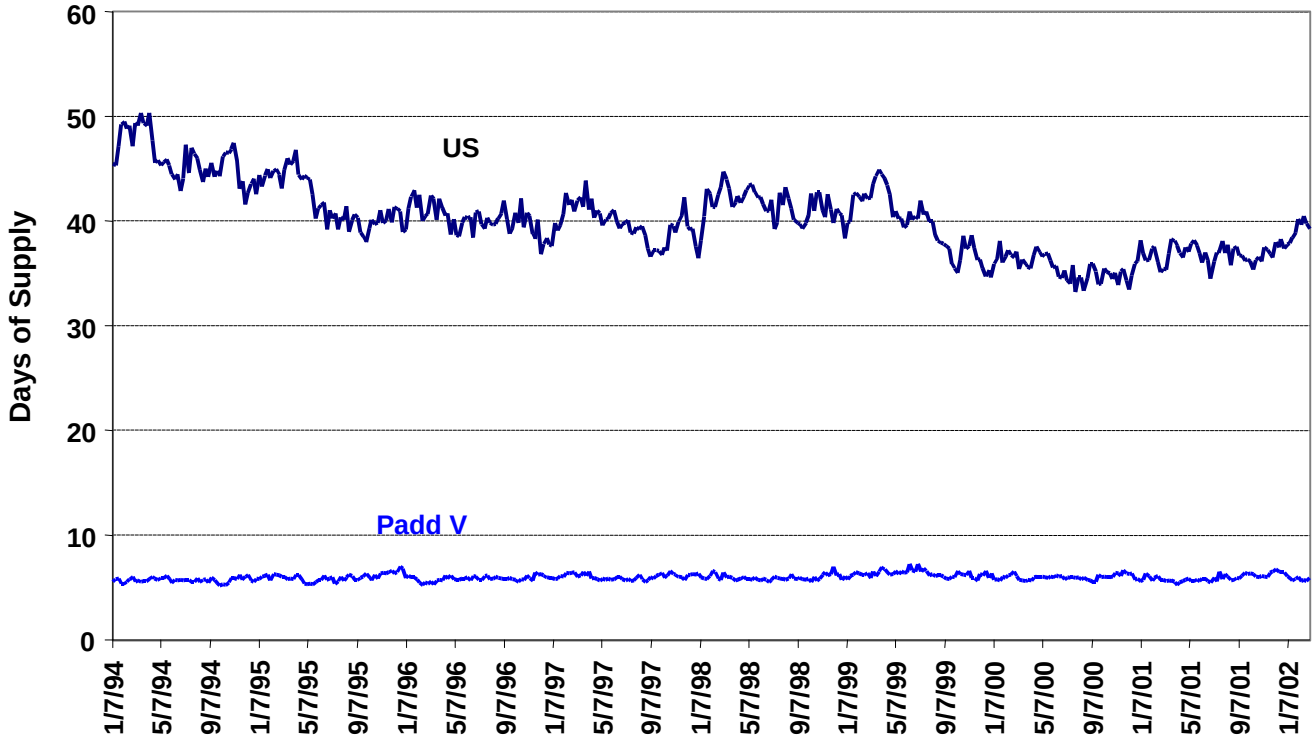
- Strategic Reserve Do's & Don'ts
- Current CA Inventories
  - Inventories
  - Available Tankage
  - Outlook
- Markets
- Options
- Effectiveness & Cost/Benefits Analysis
- Conclusions

West Coast Gasoline Stocks

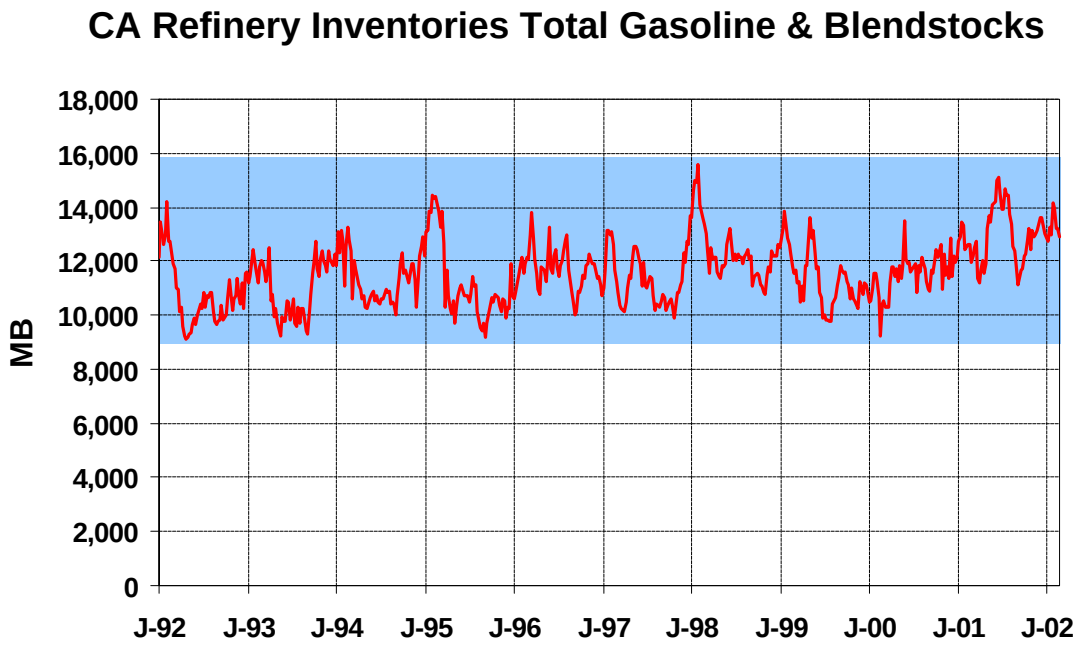
Days of Supply (Consumption/Stocks)



Gasoline Stocks on the West Coast are considerably lower than in the rest of the US; California's are lower still

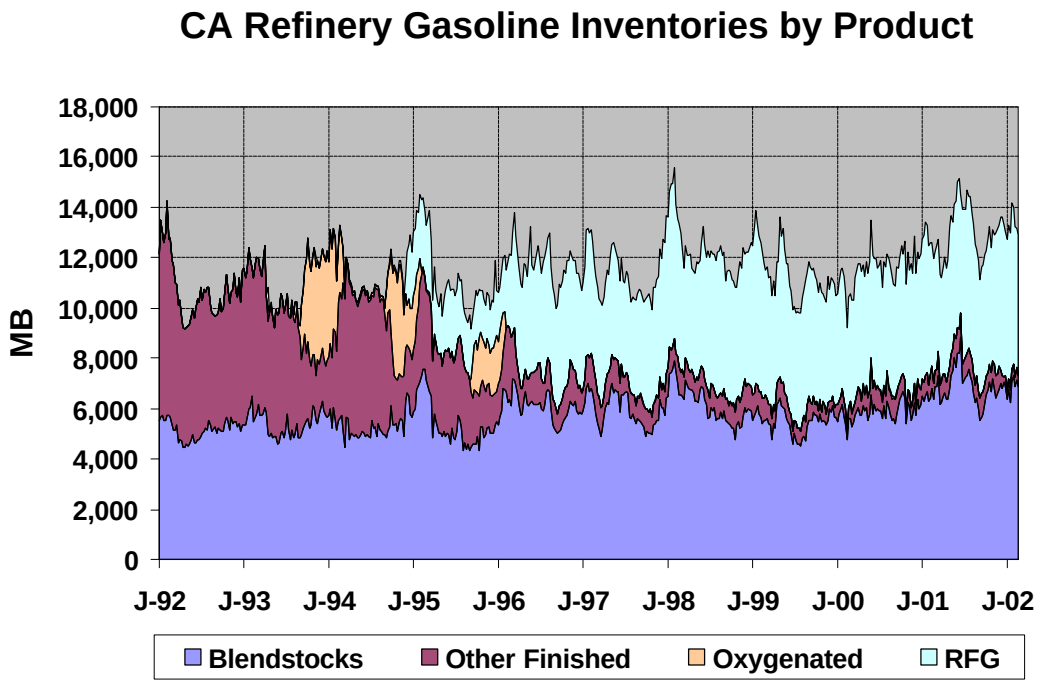
Source: A. J. Finizza Ph.D.

CA Refinery Inventories – Gasoline and Components



CA Refinery inventory working range represents only 8 days usage

CA Refinery Inventories – Gasoline and Components



Refinery finished gasoline represents only 4 – 6 days usage

CA Inventories – Capacity Reconciliation

Total Gasoline & Component Tankage

Nominal Tank Capacity Total CA	53 MM bbl
Ullage, Heels, non-operable tanks, 15%	- 8 MM bbl
Effective Total Capacity	45 MM bbl
Expected Average Inventory	22 MM bbl
Expected Average for CA as 70% of PADD V	21 MM bbl

Refineries

Nominal Tank Capacity Total CA	26 MM bbl
Ullage, Heels, non-operable tanks, 15%	- 4 MM bbl
Effective Total Capacity	22 MM bbl
Expected Average Inventory	11 MM bbl
Reported Average Inventory	12 MM bbl

CA Inventories – Inventory Planning

- Refinery inventories determined by operational requirements
- Number of tanks (“bottoms”) equally as important as capacity
- Few refiners have many options for strategic inventory considerations
- Average cycle time full to empty for tanks in distribution system (pipelines, truck racks) is weekly
- Commercial terminals offer some capacity for holding strategic inventories
- Main consideration at import terminals is cargo size for vessel deliveries

Current CA tankage offers no options to increase inventories

CA Inventories – Commercial Terminals

MM bbl	Total Tank Capacity	Clean Product Tanks	Gasoline & Components
Bay Area			
Commercial Operator	8.5	5.7	3.8
Owned by Refiner	0.6	0.6	0.6
Total	**9.1**	**6.3**	**4.4**
LA Basin			
Commercial Operator	22.0	5.7	4.6
Owned by Refiner	7.7	7.2	6.8
Total	**29.7**	**12.9**	**11.4**
Total	**38.8**	**19.2**	**15.8**

- In LA Basin, two refiners own terminals that were put in commercial service in mid 1990s
- This capacity is now increasingly needed for internal use
- Large majority of tanks in commercial terminals is leased to refiners under long-term contracts
- Capacity is no longer readily available on a spot basis

CA Inventories – Impact of MTBE replacement

MTBE Phase Out will free up tank space in import terminals but:

- MTBE is fully fungible single component, landed in few tanks with high throughput
- Replacement is plethora of specialty blendstocks, each needing segregated storage
- Waterborne ethanol, although smaller in volume, will need tanks too
- Tank size is set by cargo size rather than throughput
- MTBE de minimis requirements and sulfur specs may result in more off-spec batches requiring segregated storage
- Blending around UNOCAL patent will be more difficult

MTBE infrastructure is incapable of handling CA shortfall

CA Inventories – Commercial Tank Market

- Current shortage has increased tank rental rates to above reinvestment economics
- However, little new capacity is on the books
  - Permitting is lengthy, costly
  - NIMBY action groups and nationwide NGOs are more powerful than local industry
  - Security concerns post 9/11 cited by Ports as reason to hold applications
  - Commercial Operators base rate on utility type returns, but require long-term, bankable contracts to do so
  - Traders, importers prefer to rent tanks on a spot basis
- Closure of tank terminals in PoLA/Long Beach may continue

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  - Mechanisms
  - Forward/Futures
  - Price Volatility
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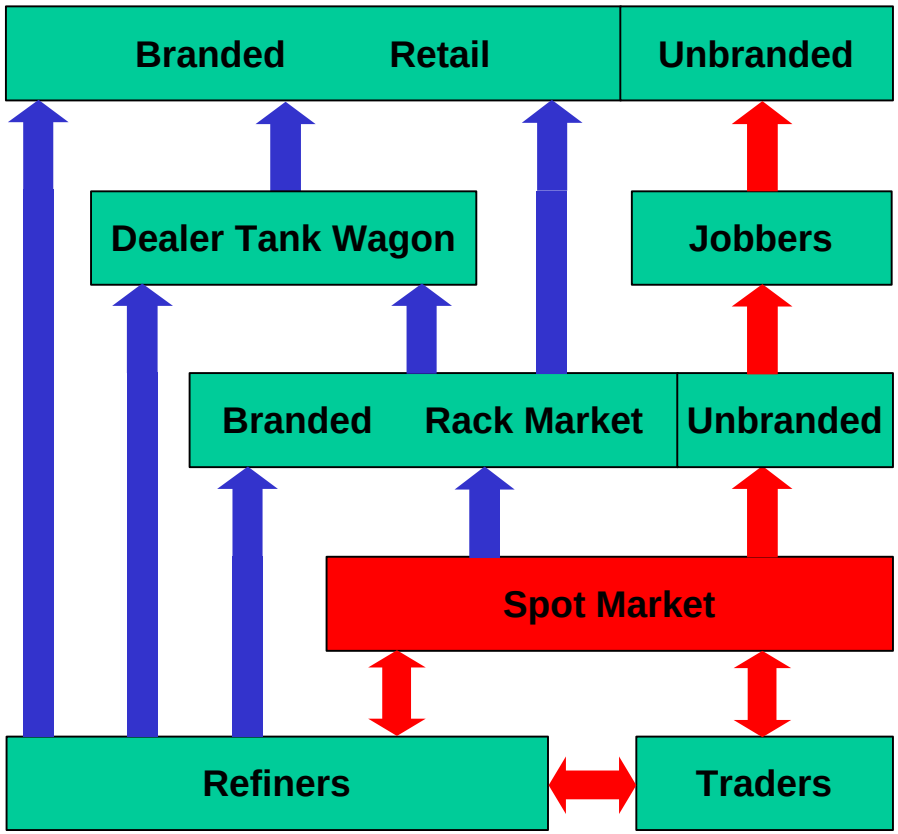
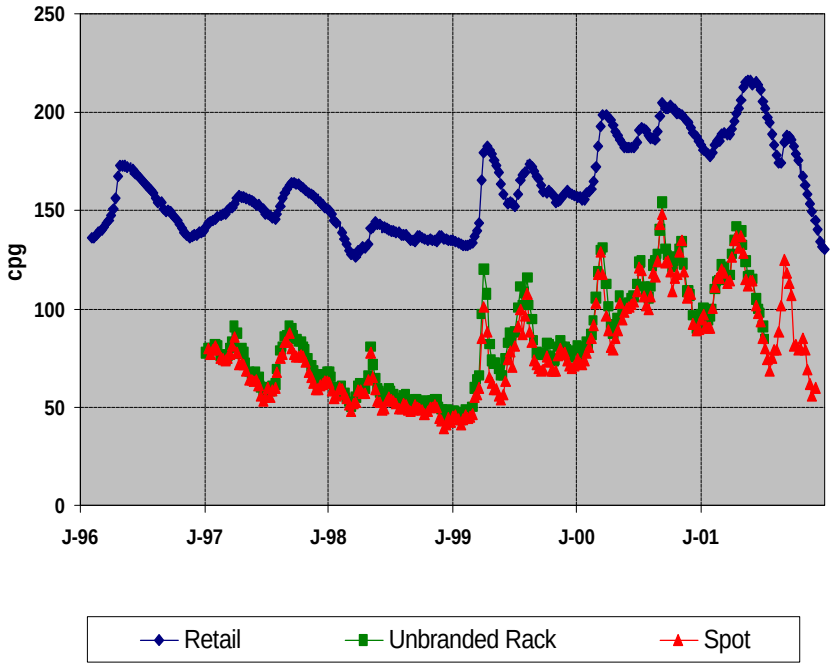
Market Mechanisms



- CA spot market is illiquid:
  - Only 20 - 30 participants
  - Fewer than 5 trades/day
- Spot market is where price spikes first occur
- Spot prices are highly volatile
  - Can move 5 cpg on rumors
  - Up 20 cpg on few trades in one day following an event
- Pricing not transparent
- Last bbl sets entire market
- Branded retail somewhat sheltered from spot spikes
- Unbranded rack buyers get pinched between spot and retail on the upswing

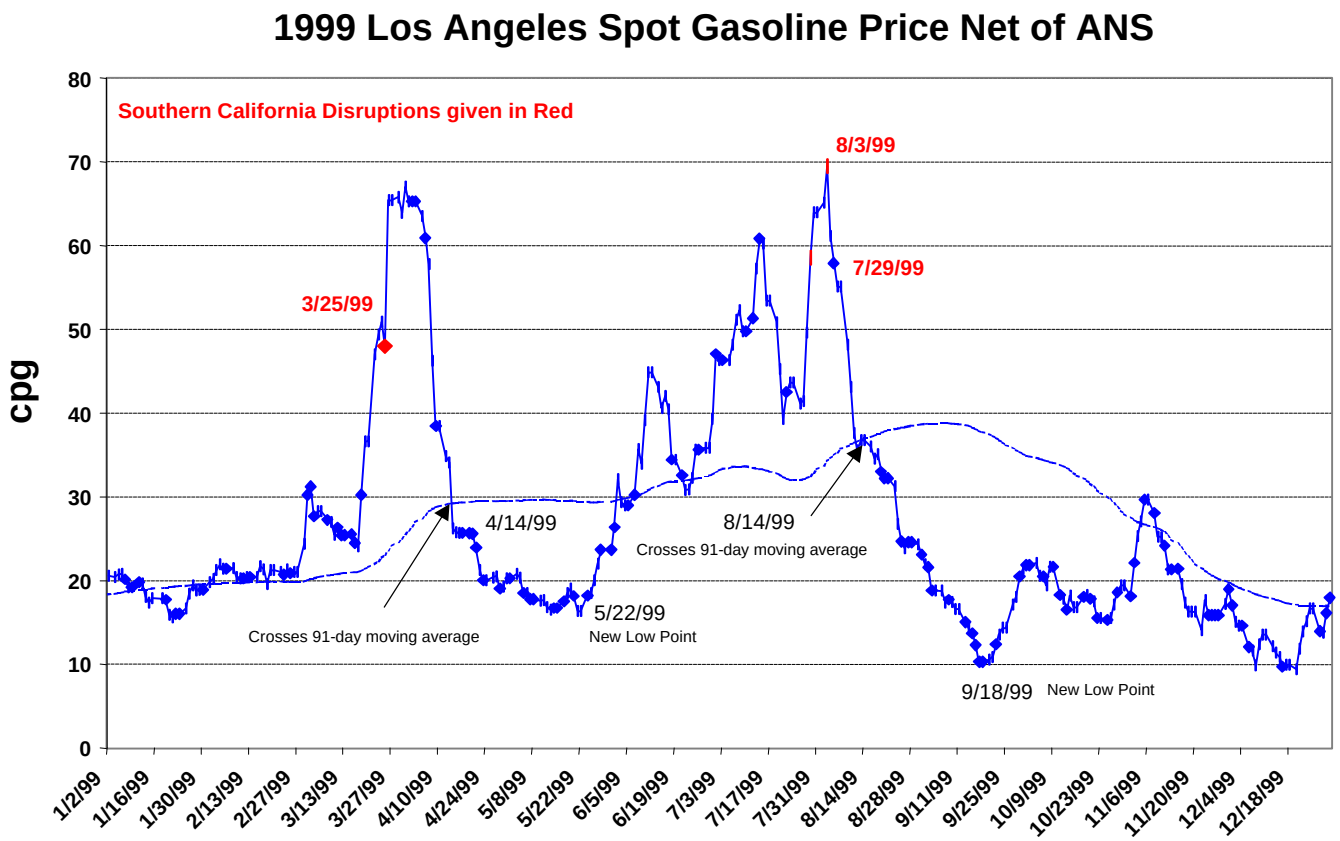
CA Market Mechanisms – Spot vs. Retail

CA Gasoline Spot & Retail Prices



- Price volatility is primarily expressed in spot and rack market
- Retail somewhat sheltered by refiners
- Independent marketers get caught between rack and retail on the upswing
- Downswing offers opportunity for independents to recoup losses

Duration of Disruption Effect

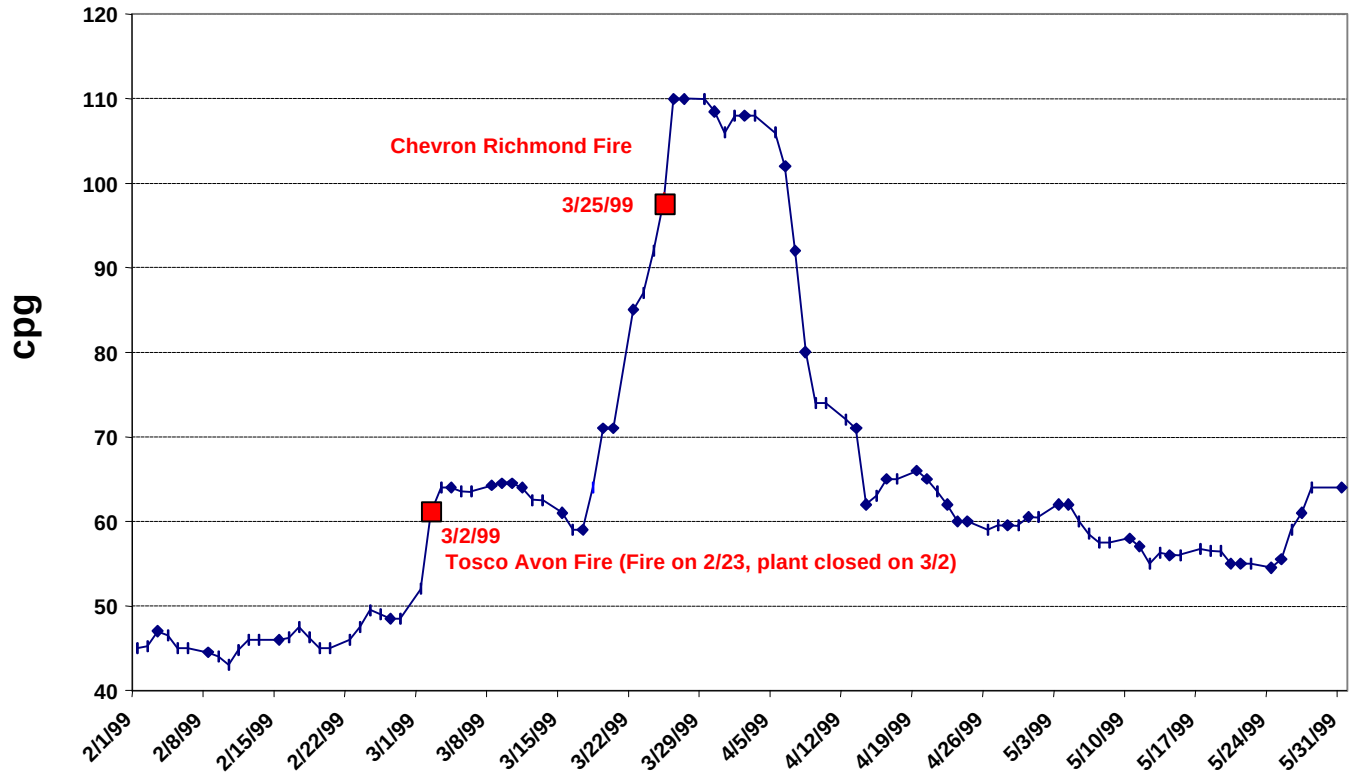


Disruption Effect Lasts 6-8 Weeks

Source: A. J. Finizza Ph.D.

Effect of Disruptions on Pricing

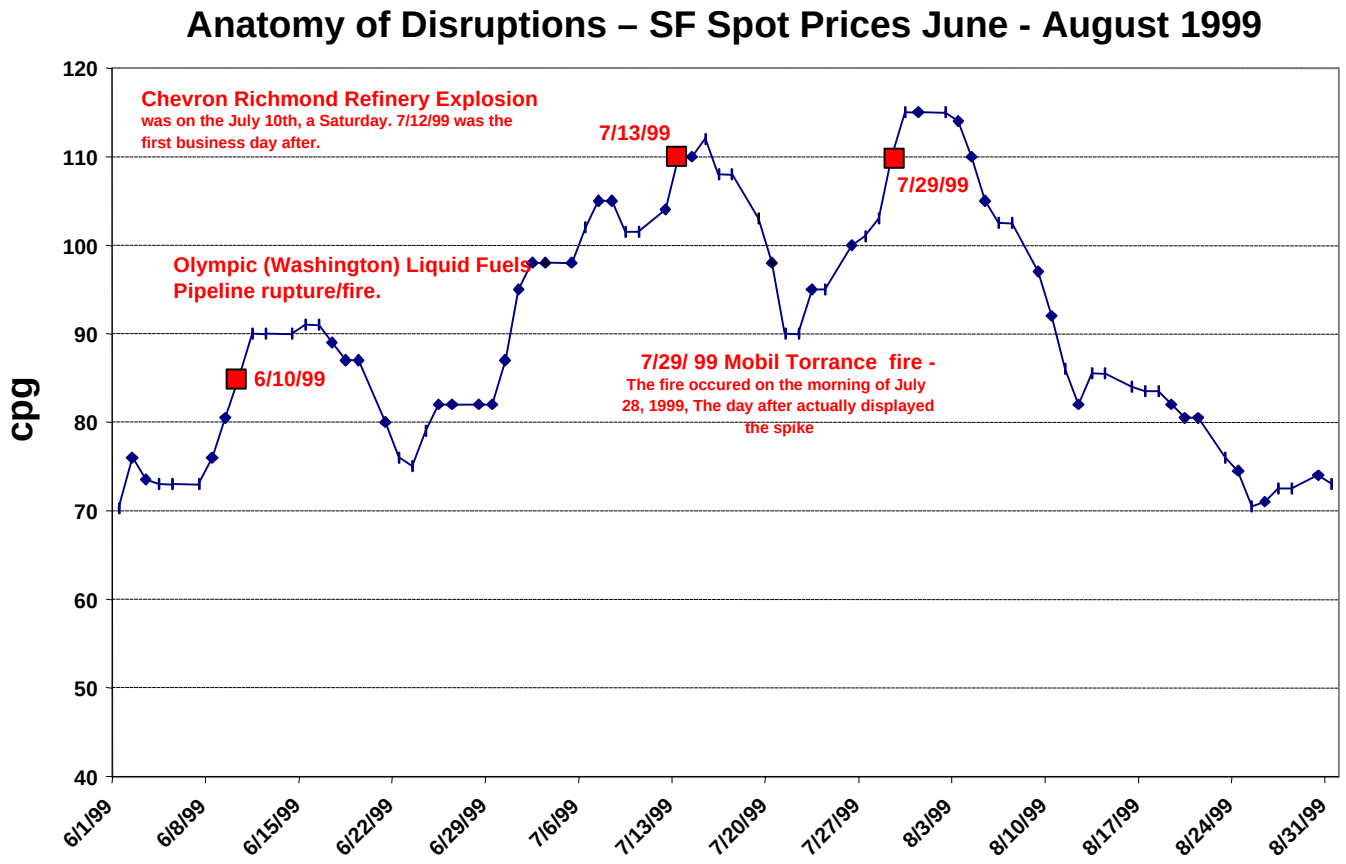
Anatomy of Disruptions – SF Spot Gasoline Prices Feb – May 1999



Refinery Disruptions Have An Immediate Impact on Prices

Source: A. J. Finizza Ph.D.

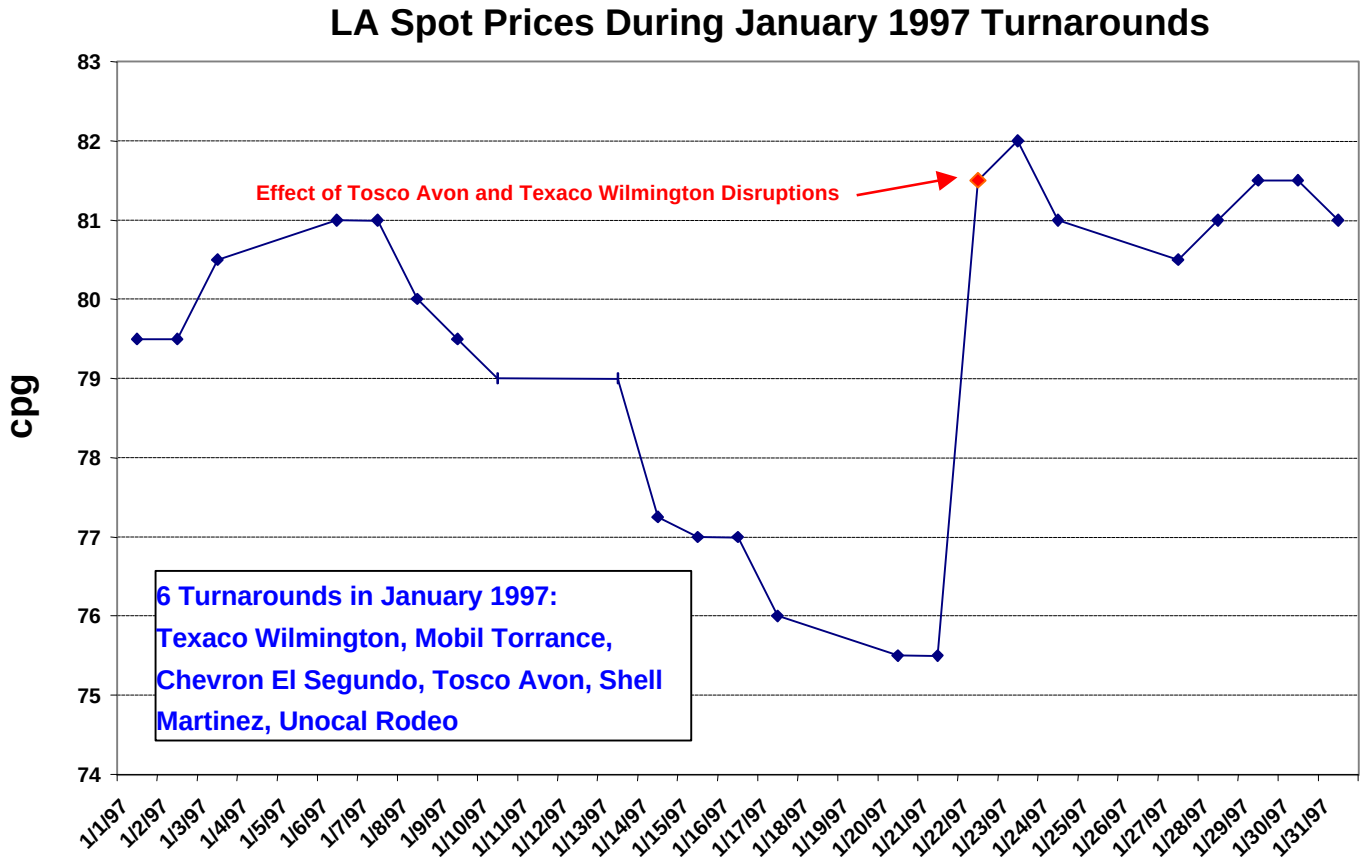
Effect of Disruptions on Pricing (Cont'd)



Refinery Disruptions Have An Immediate Impact on Prices

Source: A. J. Finizza Ph.D.

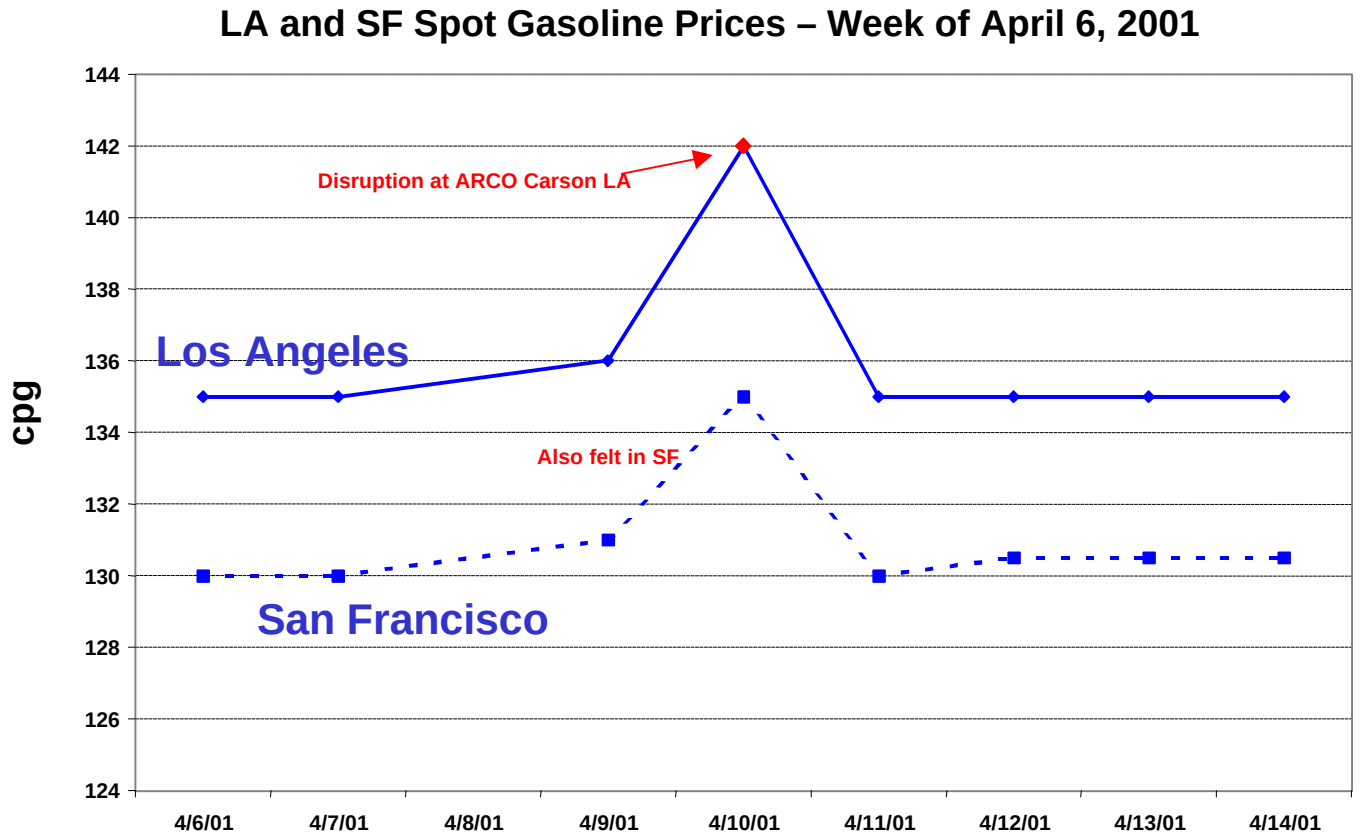
Effect of Planned Turnarounds on Pricing



Planned turnarounds do not affect prices unless coinciding with a disruption

Source: A. J. Finizza Ph.D.

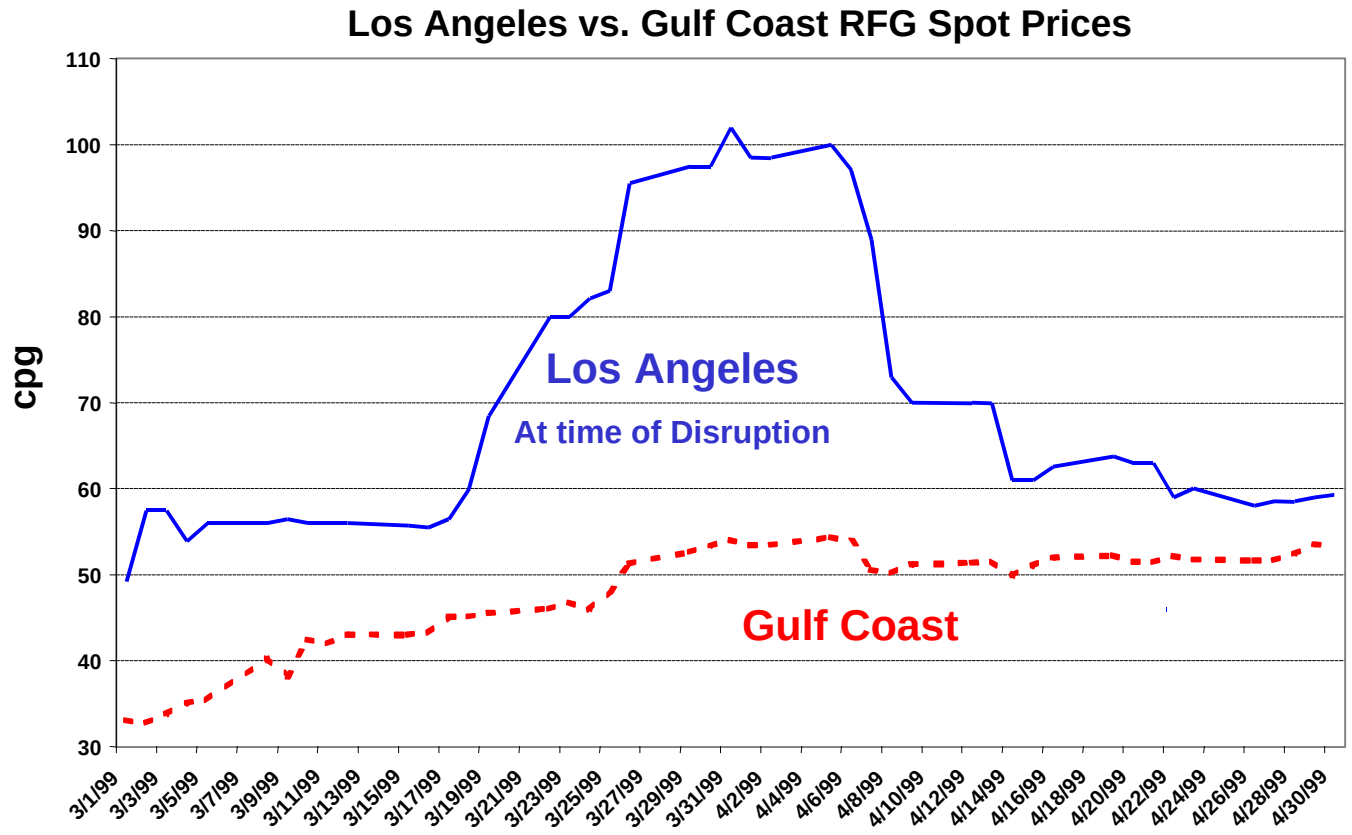
Regional Effects



A refinery disruption in either part of California affects all of California

Source: A. J. Finizza Ph.D.

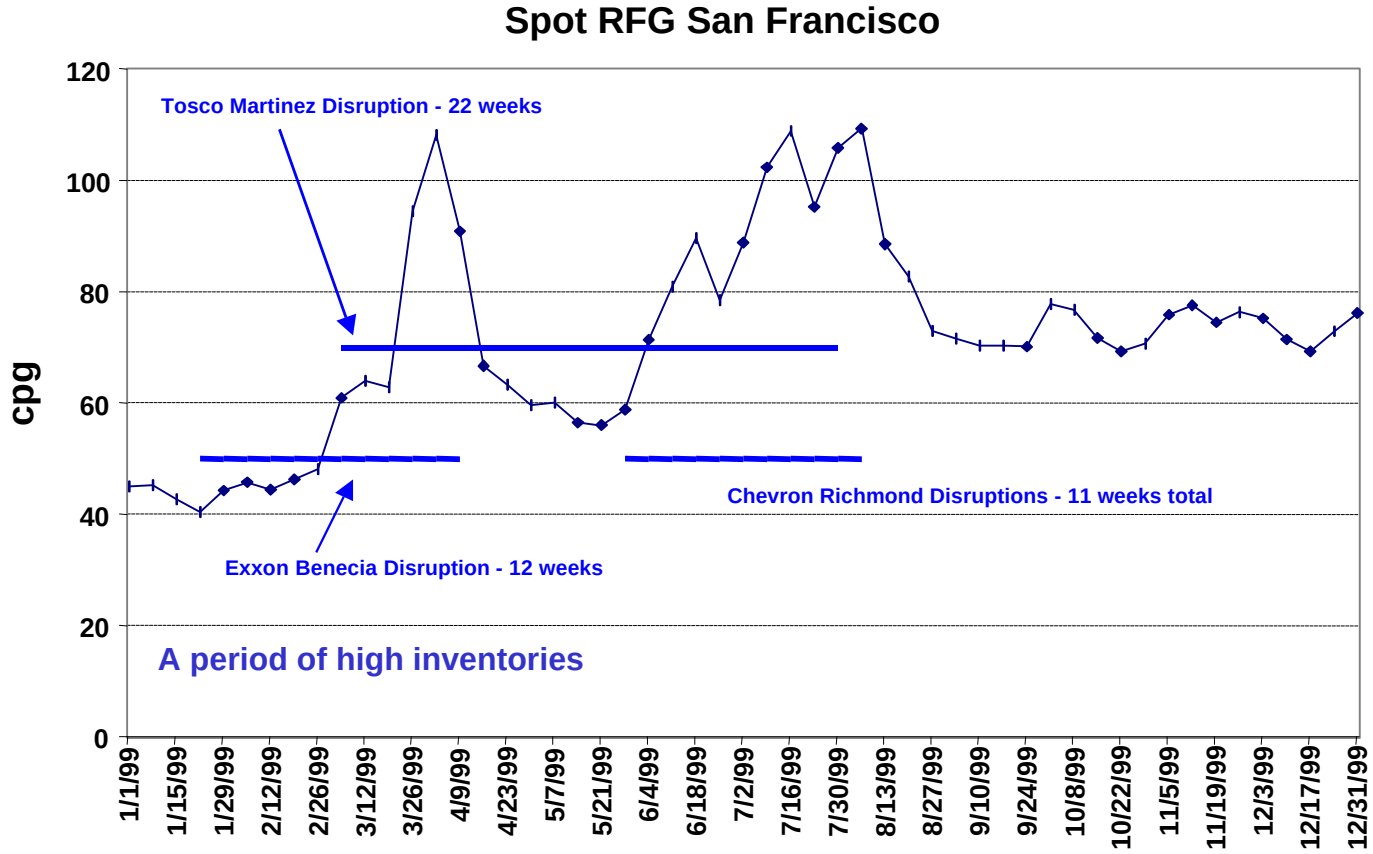
Effect of CA Disruptions Outside the State



Price Spikes are not transmitted to other areas outside of California

Source: A. J. Finizza Ph.D.

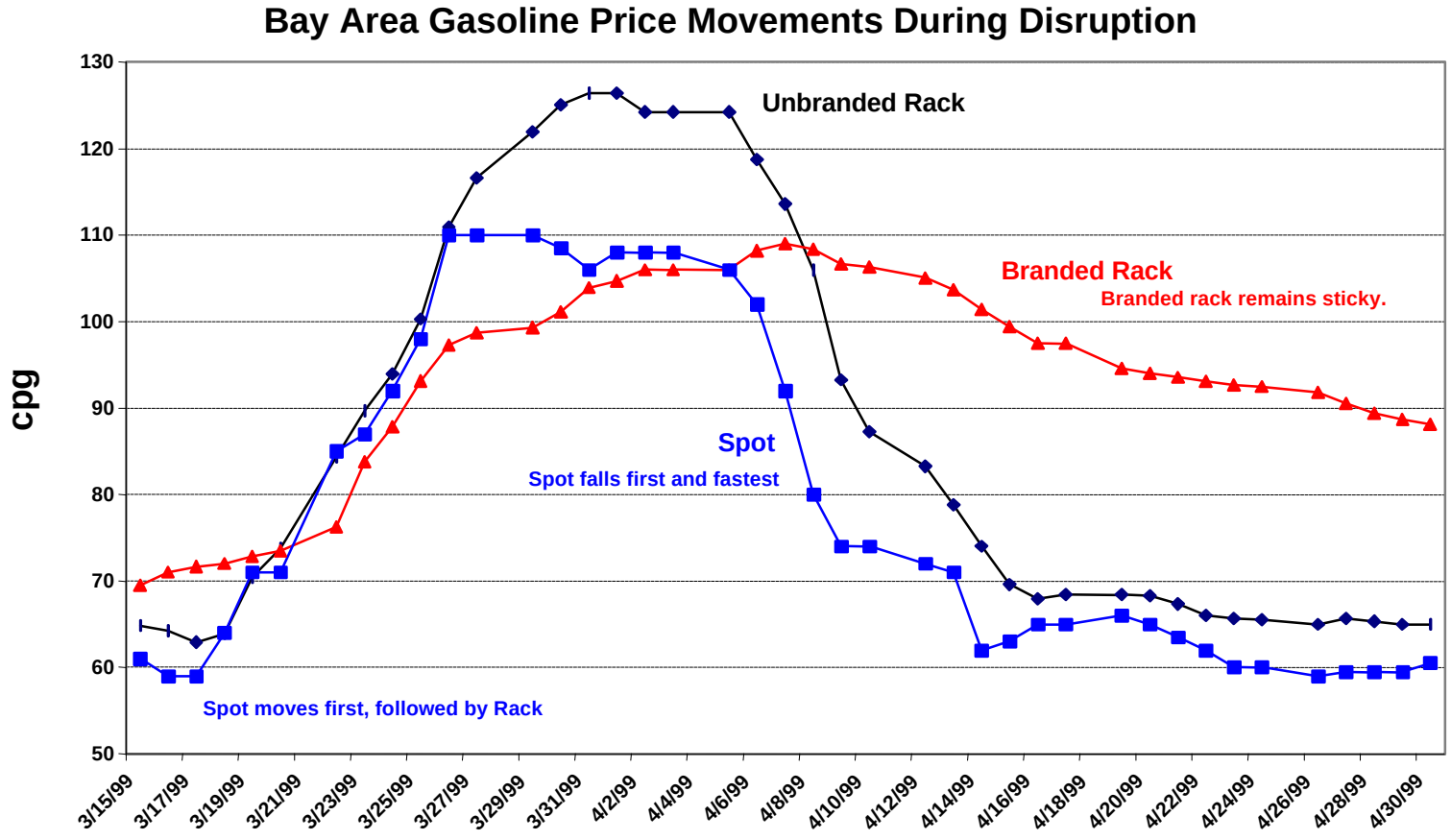
Disruptions and Price Spikes



Not all disruptions lead to price spikes

Source: A. J. Finizza Ph.D.

Gasoline Price Movements during Disruption

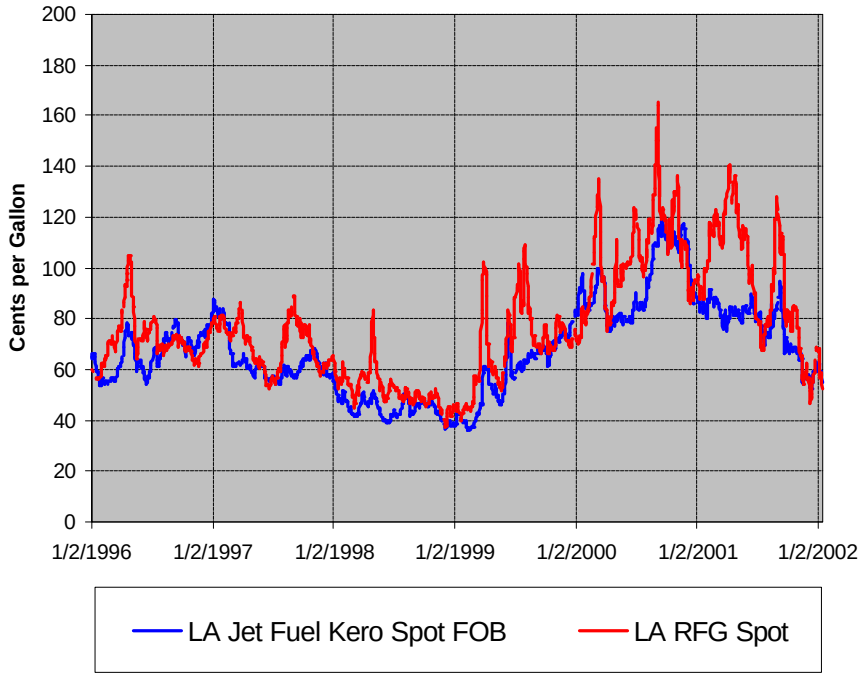


The rise and fall of prices during a disruption is asymmetric

Source: A. J. Finizza Ph.D.

CA Market Mechanisms – Distillates vs. Gasoline

LA Spot Prices for Jet Fuel and RFG



- Jet fuel is a readily fungible worldwide commodity
- Jet has broad and deep forward market
- Jet fuel can be hedged against heating oil futures
- Storage for jet in LA is ample, and is controlled for a large part by a consumer consortium
- Jet follows same underlying crude oil price curve as gasoline
- Jet has some fluctuations as supply and demand adjust
- Jet prices do not have the extreme spikiness of gasoline

Commercial Barriers to Entry

Besides physical barriers, commercial hurdles are also significant:

- Spikiness of gasoline market is not conducive to imports, time needed to locate and ship product (4 – 6 weeks) usually exceeds duration of spike
- Lack of liquidity in futures or forward market exposes importers to significant risk
- Often only blendstocks are available for imports
- Only major refiners can prepare and certify final blend
- Independent traders locked out of market, cannot link sources to end markets without physical and commercial cooperation with refiners
- Of the CA refiners, only a few are actively sourcing and trading globally
- Combination of commercial and physical access in hands of few players leaves market exposed

Commercial landscape not conducive to supplying shortfall

Creation of Forward Liquidity

- Forward Liquidity requires:
  - Minimum number of diverse buyers and sellers
  - Physical delivery point with sufficient inventory capability to act as pool and market sink
  - Fungible products, well defined specs
  - Multiple supplies
- Only when a market has deep and broad forward liquidity can a standardized, regulated future derivatives market emerge
- Only when a futures market exists can trades be effectively hedged
- Hedging is a pre-requisite for long-lead time imports by independent traders

Forward liquidity will benefit all market participants

Advantages of a California SFR

Current Situation

- No hedging mechanism
- No physical location for discharge
- No access to pipelines from offshore
- No storage for components
- Thin forward market
- Unmanageable Price Volatility
- Insufficient liquidity
- Price discovery based on limited transactions and reporting

SFR Benefits

- SFR is physical receiver based on auction differential
- SFR provides access for waterborne cargoes
- SFR enables storage flexibility in private tanks
- SFR provides physical location for forward market
- SFR enables free market to discover and hedge market value
- SFR enhances liquidity
- SFR linked to transparent electronic auction system

Disadvantages of Extreme Volatility

For Refiners

- Bad for industry image
- Increased scrutiny and oversight
- Unpredictability and cyclicality are not rewarded by Wall Street
- Long term consumer behavior is negatively impacted

For Independents

- Inversions at the leading edge of a spike
- Unable to keep customers supplied
- Unable to source supply from outside California

For Consumer

- Pays more at the pump
- Lower income levels most affected
- Has to compromise convenience and lifestyle to realize reductions in consumption

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- Options
  - Alternatives
  - Proposed solution
  - Operating Principles
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- Conclusions

Options for CA SFR

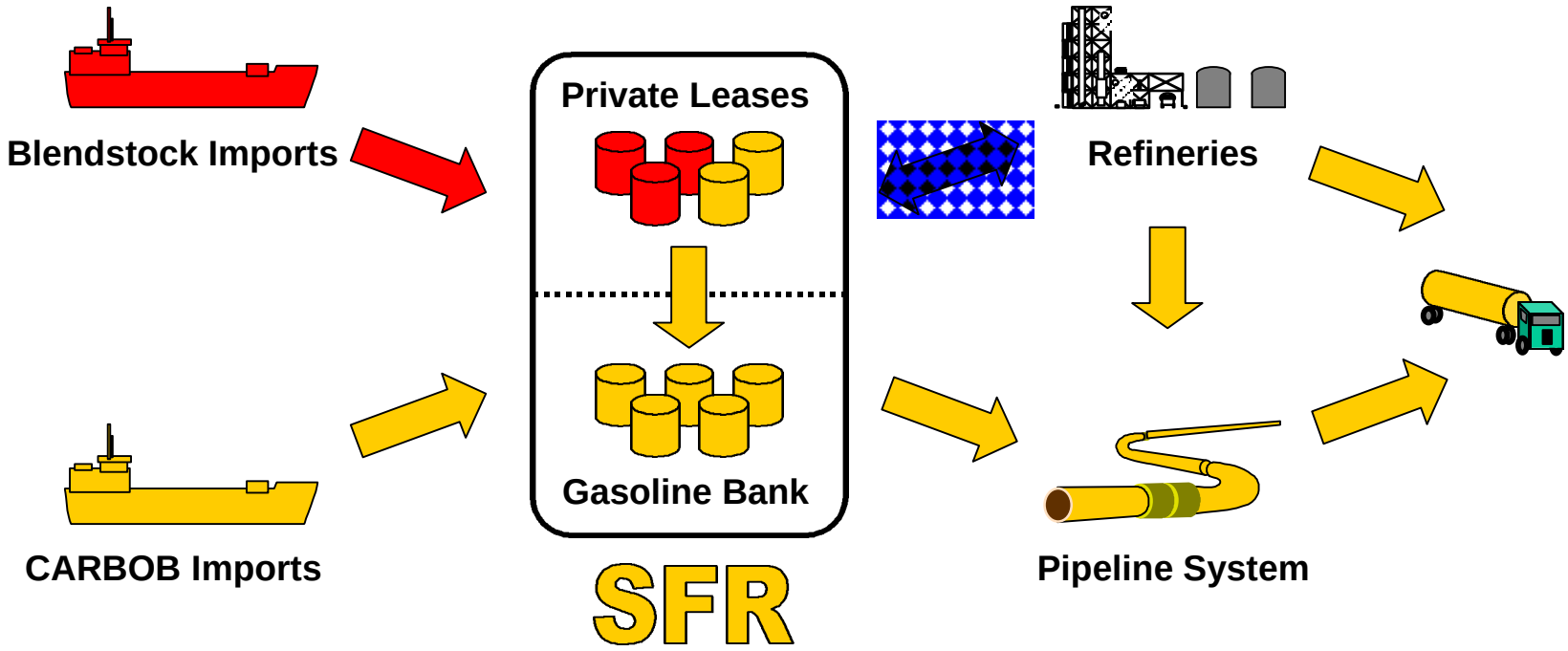
- New tankage built & operated by State
  - $75 MM investment, $17 MM fixed/costs
  - Still significant throughput costs for 3rd party pipelines, docks, etc.
  - Not cost effective
- New tankage built and operated by commercial terminal company
  - Competitive bid process to ensure lowest rates
  - Market indications are $0.45 - $0.55/bbl/month, 10 – 15 year contract
- Options could include conversion of idle fuel oil storage at power stations
- Floating storage, other idle tanks non-starters

Proposed Configuration

- Facilitate building 5 MM bbl of total storage capacity, 1 - 2 MM in Bay Area, 3 - 4 MM bbl in LA Basin
- Issue tender to qualified parties to build and operate the tankage
- State to lease approximately half of the new tankage for Reserve
- Remainder available for short term use by industry under normal commercial terms
- Industry tankage surrounding can be used for receipt of blendstocks, components and blending
- Reserve tanks to be used in summer grade CARBOB only

Net Cost to California Consumer $20 – 30 MM/year

Operating Principle

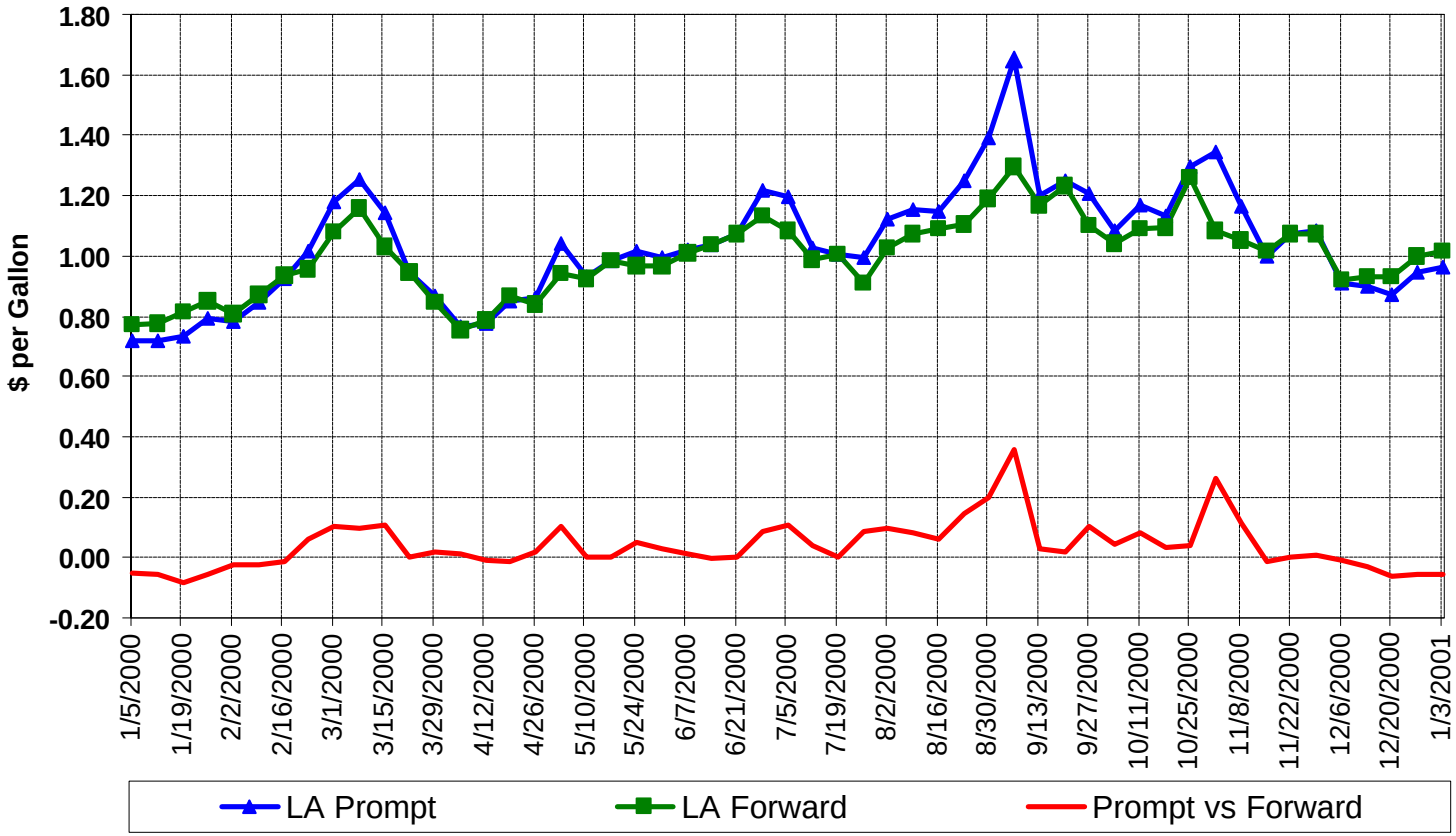


Operating Principle for SFR

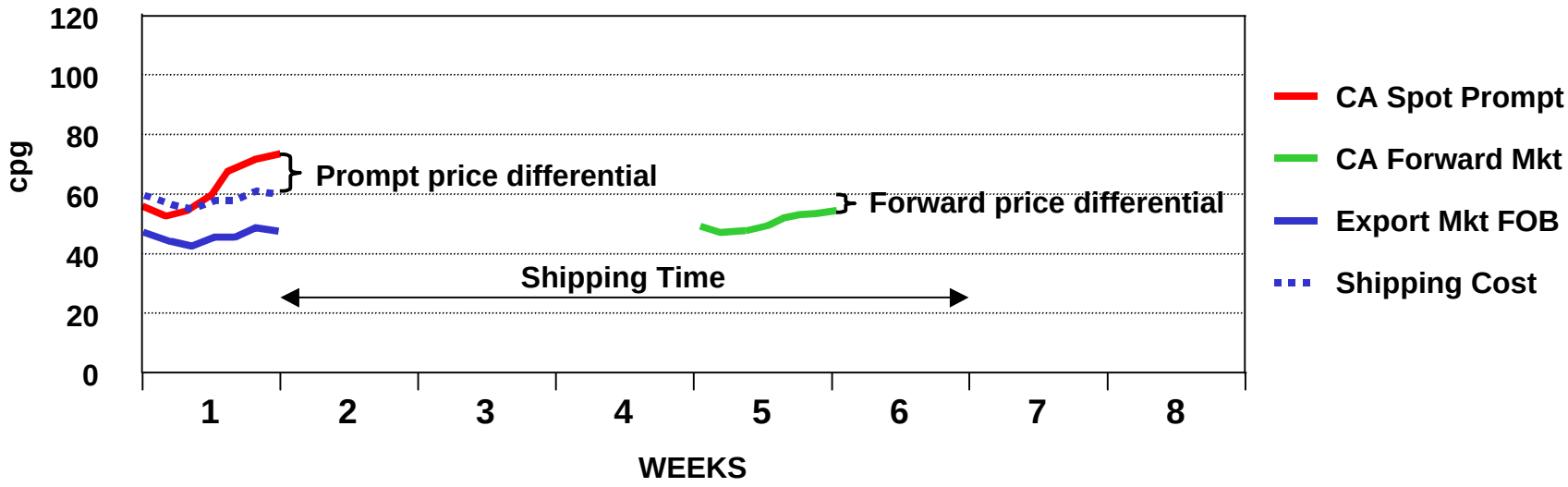
- Initial fill 2.5 MM bbl to be purchased as Phase III CARBOB gradually and over time so as to not upset the market
- Use offsets from FPR to finance part of SFR, evaluate possibility of power for gasoline swap for rest
- Conduct daily electronic auction for 50 TBD of CARBOB and components for prompt lifting, 6 weeks max redelivery
- Speculative use of reserve volumes limited by physical lifting & re-supply requirements and quantity limitations
- Any qualified participant can participate

Create *The Gasoline Bank of California*

LA Spot Prompt versus Forward Markets 2000

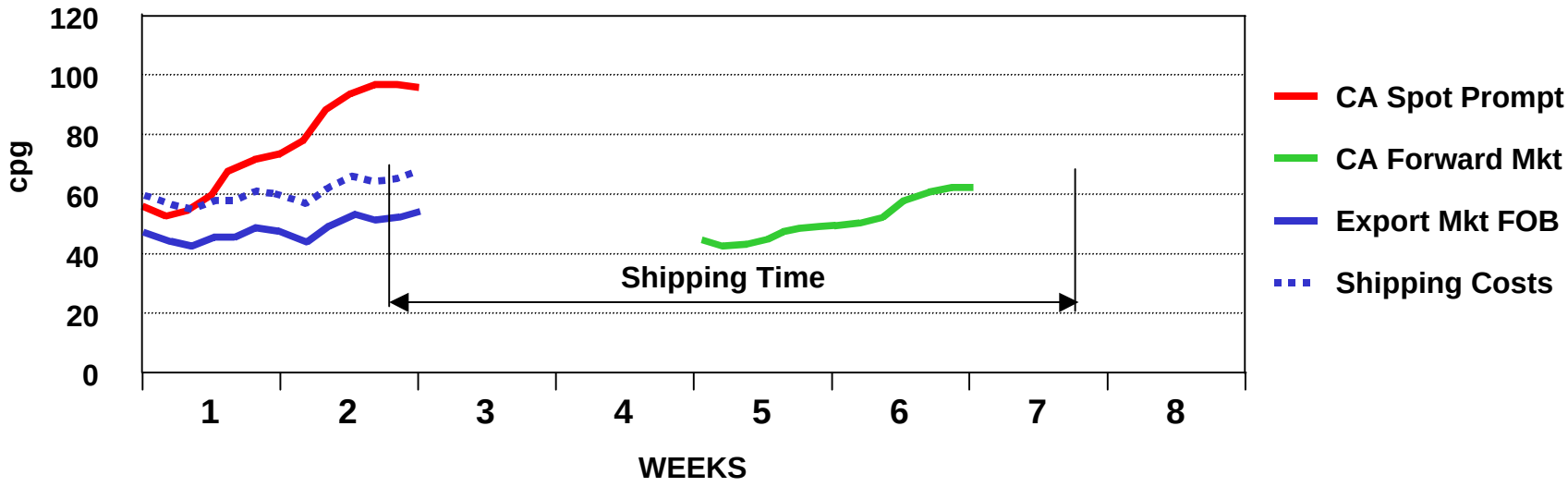


Analysis of a Price Spike – Current Practices



- In Week 1, Company A's refinery has a fire
- As the extend of the damage becomes clear, and Company A and traders start buying in the spot market, prices move up sharply. The market becomes more backwardated, since forward prices don't follow
- On a prompt basis, it now pays for an importer to bring in a cargo, but a forward sale timed for the arrival of the cargo would still result in a loss

Analysis of a Price Spike – Current Practices

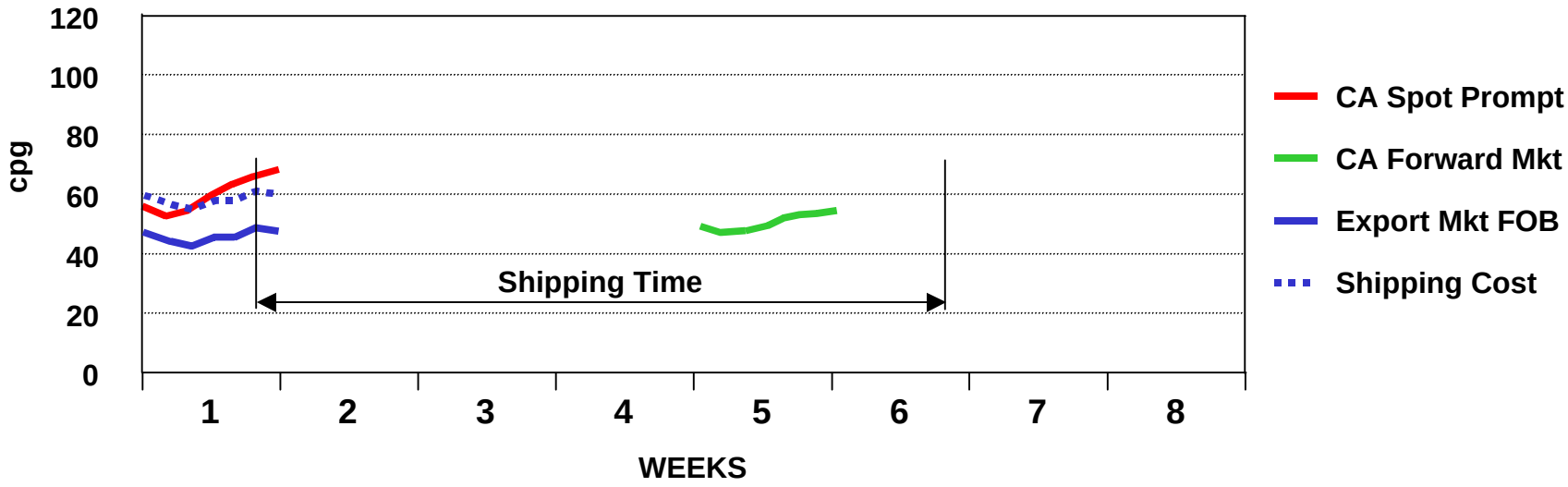


- In week 2, Company B announces a delay in the restart of a refinery that was down for maintenance
- Prices now rise sharply to double that of world markets. The forward market also starts to move up, but is still backwardated and does not allow to lock in a forward contract
- World market prices are not moving up much and the gap widens to 40 cpg based on landed costs CA. Importer C has found tankage and decides to float a cargo

Analysis of a Price Spike – Current Practices

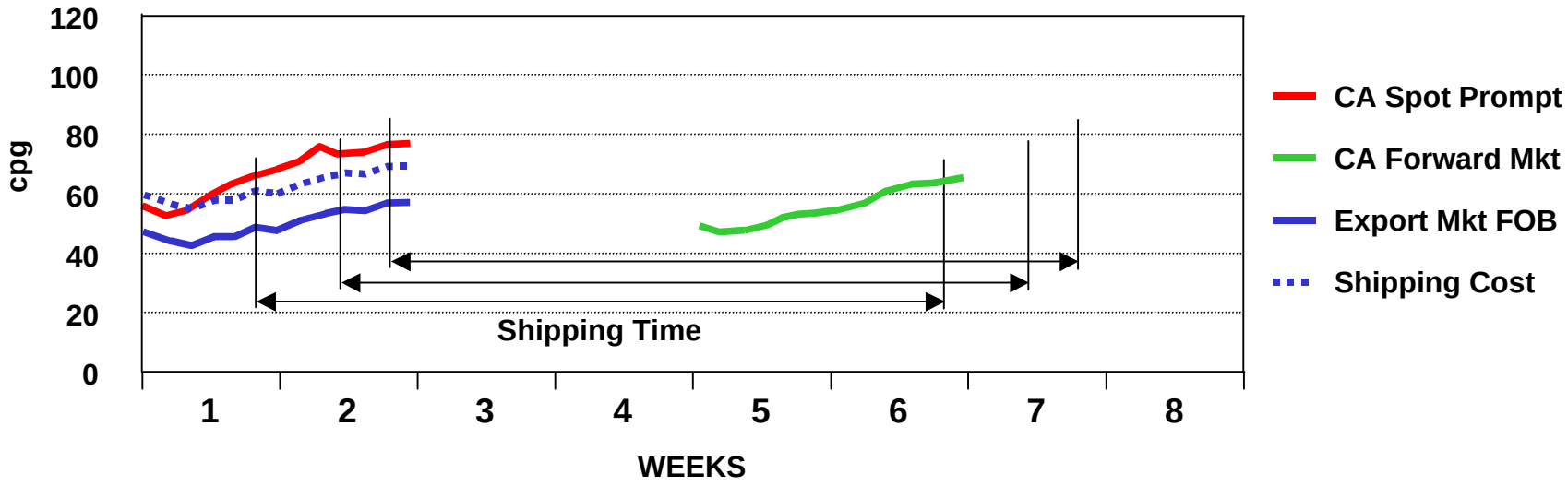
- In week 4, refiner B finally completes the turnaround and starts up their refinery. Spot prices start to drop.
- In week 5, refiner A is able to bring some production back on line from the damaged unit. Prices now fall rapidly.
- By the time importer C's cargo shows up, the market has fallen well below his cost.

Analysis of a Price Spike – SFR In Place



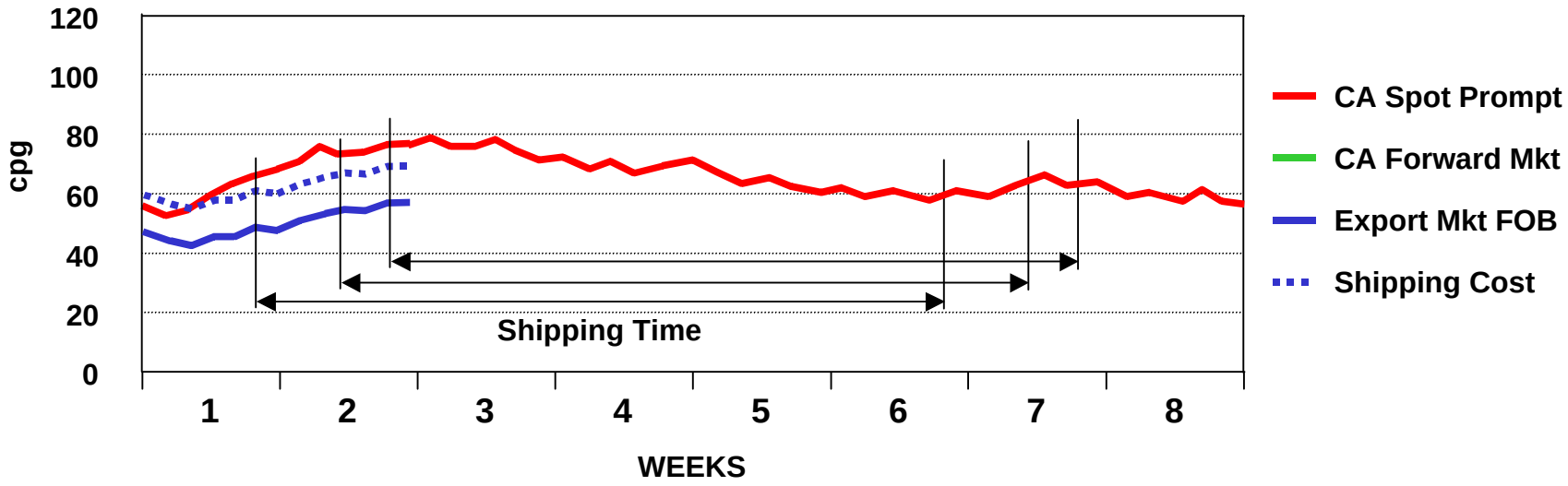
- In Week 1, Company A's refinery has a fire.
- As the extend of the damage becomes clear, and prices start to move upward to where they exceed costs of imports, Company A lifts product from the reserve and books import shipments to backfill the time swap.
- Prices do not move up significantly above import levels. The forward market follow SFR bid action rather than anticipation of the duration of the price spike.

Analysis of a Price Spike – SFR In Place



- In Week 2, Company B announces a delay in the restart of a refinery that was down for maintenance.
- Company B now also starts lifting from the reserve and buying import blendstocks to backfill. Trader C also is chasing some imports and imports markets go up in price.
- Prices do not move up significantly above import levels. The forward market follow SFR bid action rather than anticipated of the duration of the price spike.

Analysis of a Price Spike – SFR In Place



- Cargoes arriving in weeks 6 – 8 replenish the reserve and have no impact on the market

Effect of SFR is to peg CA to world market + import cost, without forward price risk or physical barriers
Scarcity of suitable imports remains an issue

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  - Effectiveness
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Elasticity Approach

	Demand Price Elasticity	
	Short-run	**Long-run**
Range of estimates	**-.04 to -.4**	**-.23 to -1.37**
Individual studies:		
FTC (2001) Midwest Gasoline Investigation	-.1 to -.4	Not reported
WSPA (2001) (PIRINC study)	-.05	Not reported
API (Porter) (1996)	-.19	-.71
Haughton & Sarkar (1996)	-.12 to -.17	-.23 to -.35
Espey (1996)	Not reported	-.53
Goel (1994)	-.12	Not reported
Goodwin (1992)	-.27	-.71 to -.84
Sterner (1992)	-.18 (.03)*	-1.0 (.15)*
World Bank (1990)	-.04 to -.21	-.32 to –1.37
Dahl (1986)	-.13 to -.29	-1.02
Her medium term estimate:		-.6

* the standard error of estimate is in parentheses

The Literature suggests a Wide Range of Demand Price Elasticities

The Literature is light on estimates on Supply Price Elasticities

Source: A. J. Finizza Ph.D.

Combined Demand-Supply Effect

Shock Price elasticity = Price Supply elasticity – Price Demand elasticity

- FTC used -0.2 in Midwest Gasoline Study
- Berkeley's Borenstein uses -0.15
- Brookings' Perry uses -0.05

Plausible estimates of of shock price elasticity:

-0.1 to -0.2

An elasticity of –0.1 means that a 10% increase in price causes a demand change of –0.1 x10%= -1%.

Source: A. J. Finizza Ph.D.

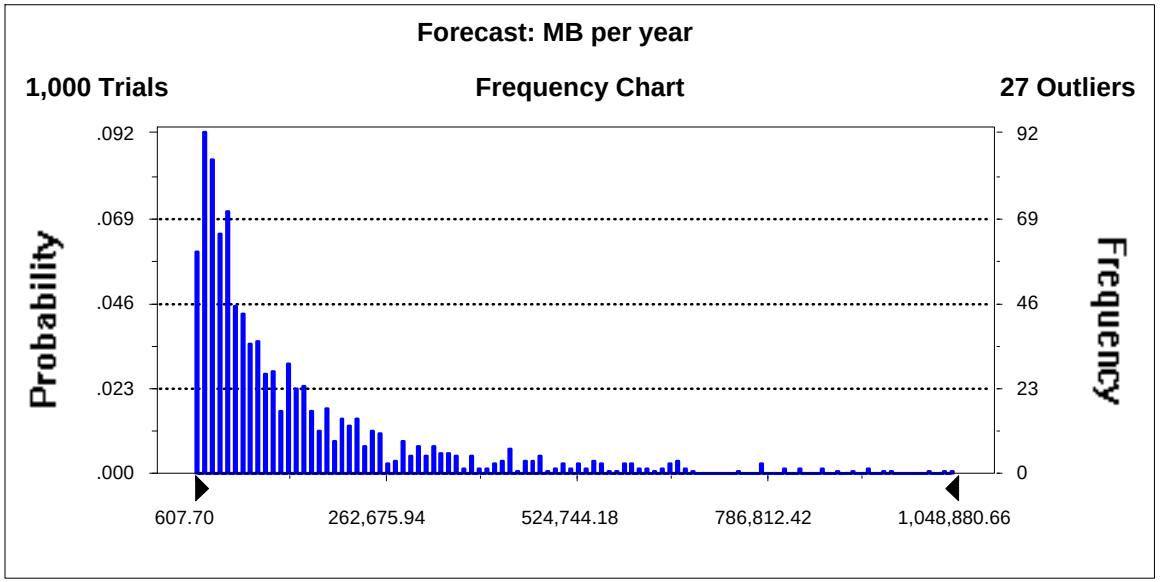
Assumptions for Monte Carlo Analysis

- Chance of a refinery having a measurable disruption in a week is 0.017 (Binomial distribution approximated by the Normal distribution)
- Distribution of disruption sizes (in MB): Lognormal with mean of 20 and standard deviation of 15
- Distribution of Disruption lengths (weeks): Lognormal with mean 2.7 and s.d. 3.8

(Data derived from Historical records March 1996 to March 2001)

Source: A. J. Finizza Ph.D.

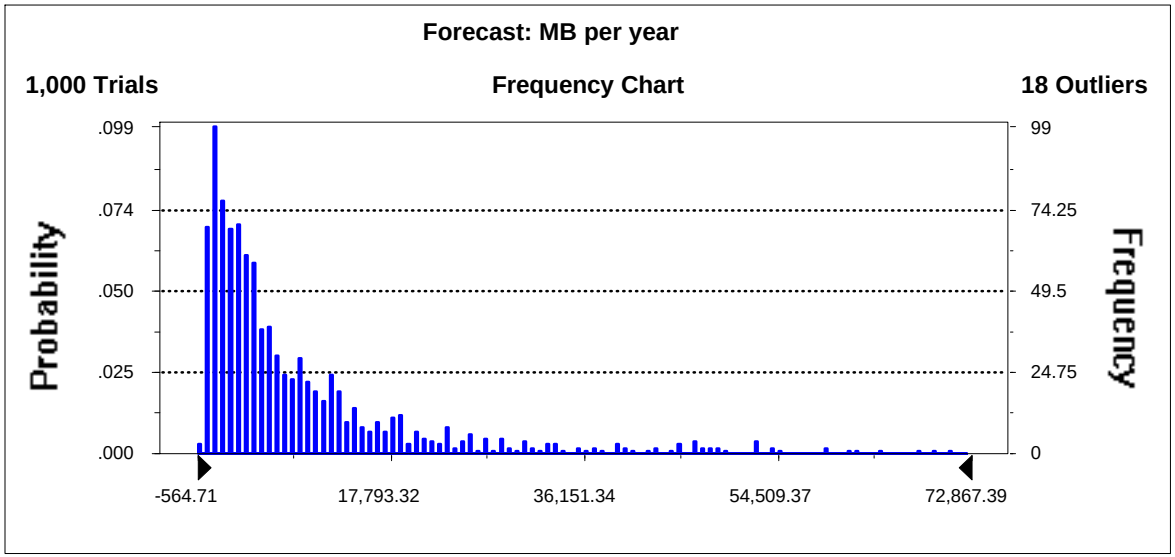
Distribution of Disrupted Barrels (Averages)



	MM bbl	% of Production
Expected Value (mean)	**4**	**1.2**
80TH percentile	**5**	**1.5**
90th percentile	**9**	**2.7**

Source: A. J. Finizza Ph.D.

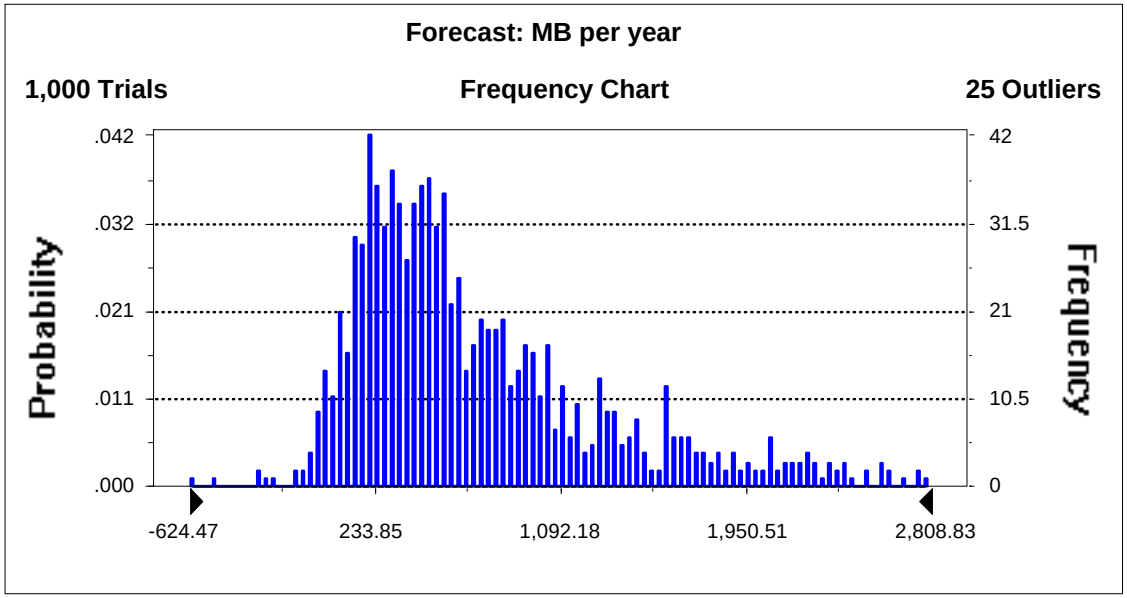
Distribution of Disrupted Barrels (Lows)



	Millions of Barrels	% of Production
Expected Value (mean)	**11**	**3.5**
80TH percentile	**14**	**4.3**
90th percentile	**25**	**7.6**

Source: A. J. Finizza Ph.D.

Distribution of Disrupted Barrels per Year (lows)



	MM bbl	% of Production
Expected Value (mean)	**.8**	**.2**
80TH percentile	**1.4**	**.4**
90th percentile	**1.7**	**.5**

Source: A. J. Finizza Ph.D.

Implications for Additional Consumer Costs

Expected Value - Billions of Dollars

Assumed Elasticity	Low Year Parameters	1996-2001 Average Parameters	1999 Parameters
-0.1	1.75	2.10	6.13
-0.2	.88	1.05	3.06

Assuming retail gasoline = $1.25 per gallon

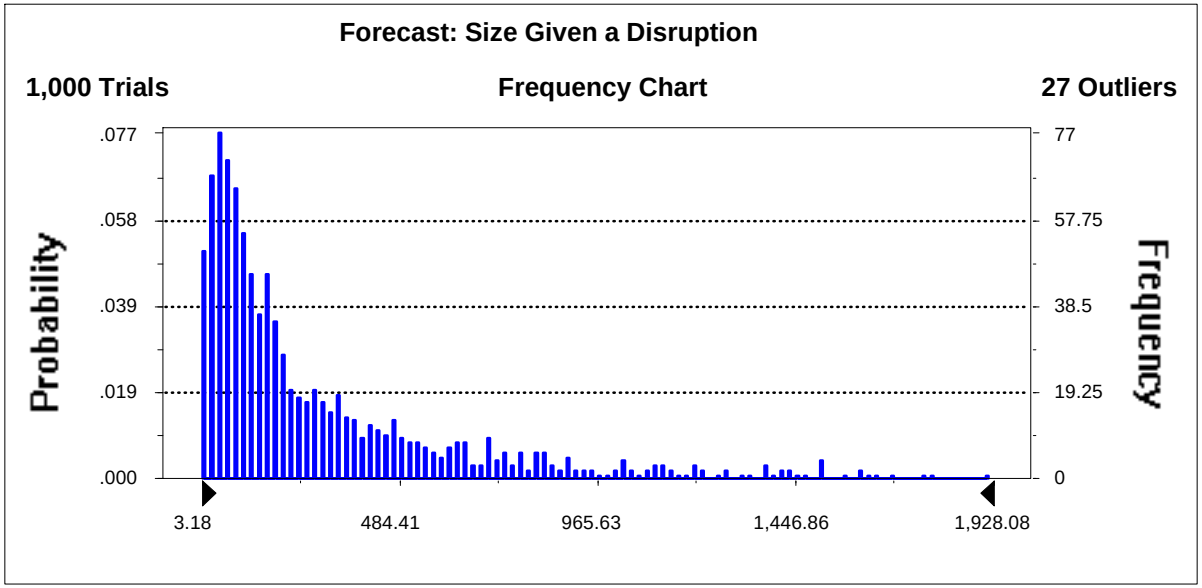
Source: A. J. Finizza Ph.D.

How To Size The Strategic Fuel Reserve?

- Legislative Prescription = ~ 2300 mb
- Assume one refinery suffers a 20 disruption (average) for 2.7 weeks (19 days) = 380 mb
- Cover maximum disruption in 1999 = ? mb
- Use Monte Carlo solution ⇒

Source: A. J. Finizza Ph.D.

Expected Size of a Disruption (Impact x Length)



Distribution of Size of Disruption - MB

Expected Value (mean)	**385**
80TH percentile	**525**
90th percentile	**870**
95th-percentile	**1380**

Source: A. J. Finizza Ph.D.

Probability of Coinciding Disruptions in Same Month

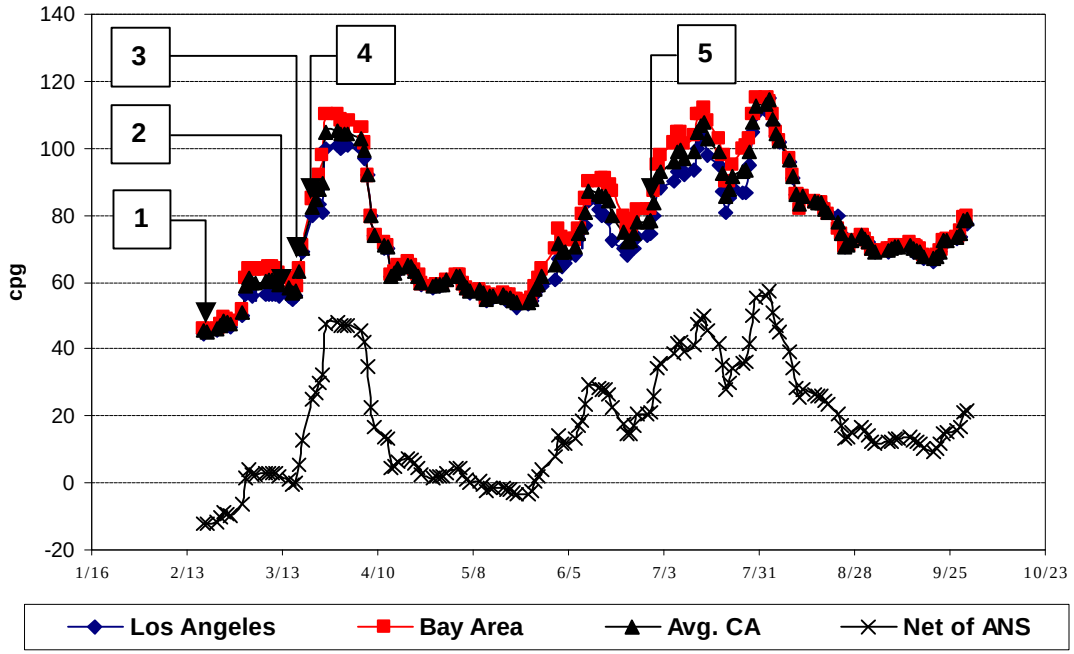
Number of Refineries Disrupted At Same Time	Probability
0	0.838
1	0.157
2	0.014
3	0.001
4+	0.000025

Note: Assumes Independence

Source: A. J. Finizza Ph.D.

Effectiveness of SFR – Design for 1999 outages

1999 CA Refinery Outage and Price Spikes

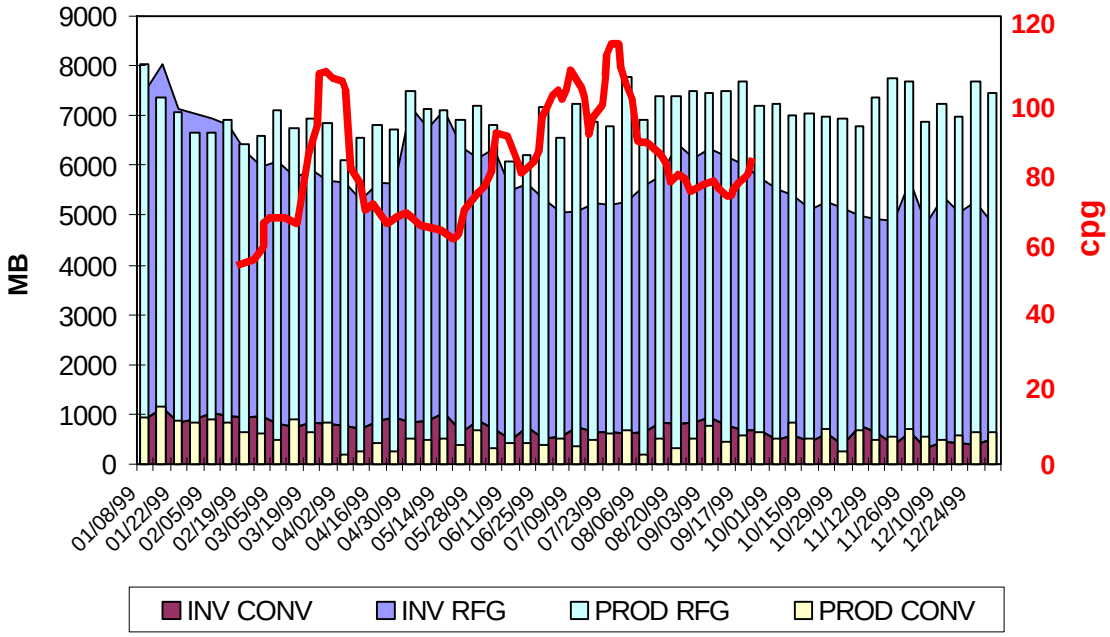


1 = Tosco Avon Fire 2 = ARCO Carson FCC 3 = Chevron Isomax
4 = Exxon Benicia FCC 5 = Chevron Richmond Fire

Effectiveness of SFR – 1999 Inventory & Production

Stillwater Associates

1999 CA Gasoline Inventories and Weekly Production



- Av. lost production: 95 TBD
- Additional imports: 11 TBD
- Net ex refinery: - 84 TBD
- Inventory drawdown: 25 TBD
- Average net loss: 59 TBD
- Spot prices +100%
- Retail Prices + 45%
- Demand: - 6%
- Implied elasticity: - 0.13
- 2 MM reserve would have covered 7 – 10 weeks of inventory drawdown
- Imports would have been easier

Forward Gasoline Bank would have been effective in 1999

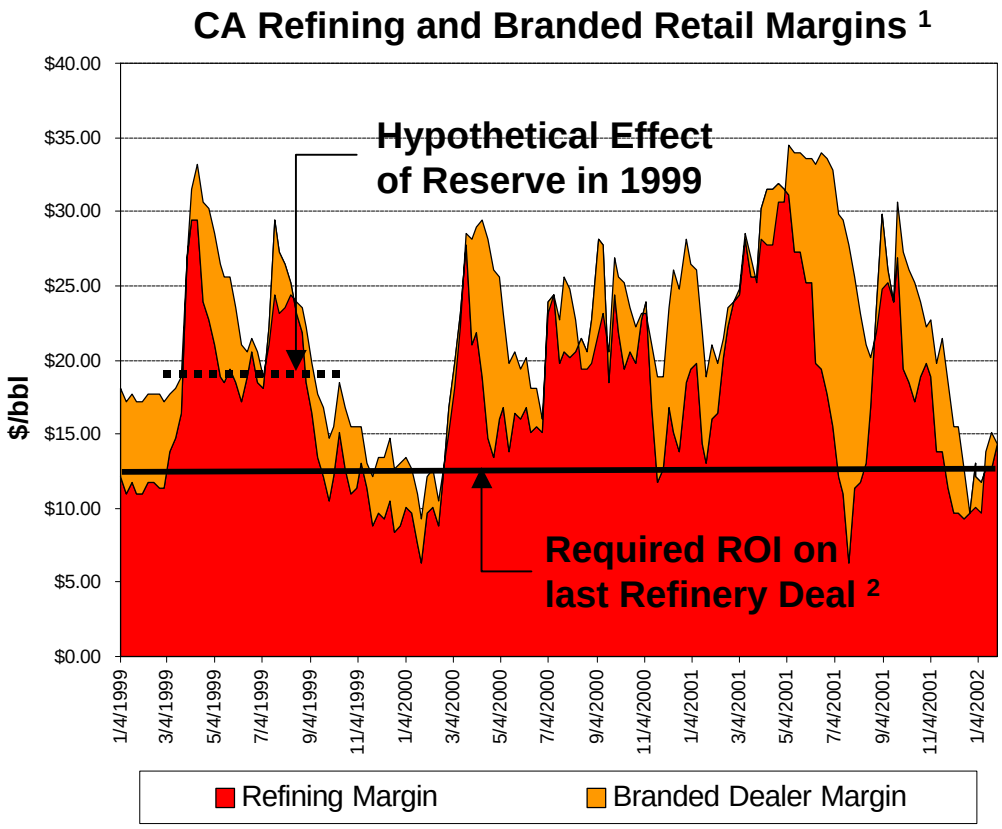
Cost of Reserve

- Lease and operating cost of reserve in rented new tankage $20 MM per year
- Cost of debt service on initial fill if purchased by State $5 – 10 MM per year
- Cost of initial fill may be substantially lower if obtained with FPR offsets
- Fees for daily auctions may contribute up to $10 MM per year
- Net cost of maintaining and operating the reserve are likely to be less than $30 MM per year

Consumer Impact – Price Elasticity

- 5 – 10% shortfall translates into 50 to 100% price spike
- If high prices are sustained over longer periods, more supplies are attracted
- Even with sub-optimal logistics, supply and demand will find new equilibrium
- Incremental barrel will set price level for entire market
- Incremental barrel likely to be an exotic blending component shipped in from remote source
- Chronic shortage will absorb initial price elasticity
- Supply disruptions under these circumstances will cause more severe price spikes

Cost Effectiveness – Benefits to CA Consumer



- Presence of reserve in 1999 might have saved consumers on average $5/bbl (12 cpg) over 90 days, or $0.5 BN
- Cumulative effect over 1999 through 2001 is $4.7 BN
- Even with reduction of peaks, prices remain based on imports

1. **Based on branded retail prices minus taxes and cost of crude oil**
2. **Tesoro Press Information Feb. 05, 2002**

Agenda

- Supply/Demand Balance
- Requirements for SFR
- Other Petroleum Reserves
- Current CA Inventories
- Alternative Solutions for SFR
- Commercial Aspects
- Effectiveness
- Cost/Benefits Analysis
- Conclusions

Conclusions

- CA has become increasingly import dependent
- Infrastructure currently inadequate to handle imports, especially in LA Basin
- MTBE phase out will cause 50 – 100 MTBE shortfall which will have to be met through imports
- Price volatility will increase when supply disruption occurs when market is already chronically short and initial price elasticity has been absorbed
- SFR as proposed can be a cost effective way to increase market liquidity and lower import barriers
- Volatility can be substantially mitigated without impacting supply side factors such as import flows and refinery returns